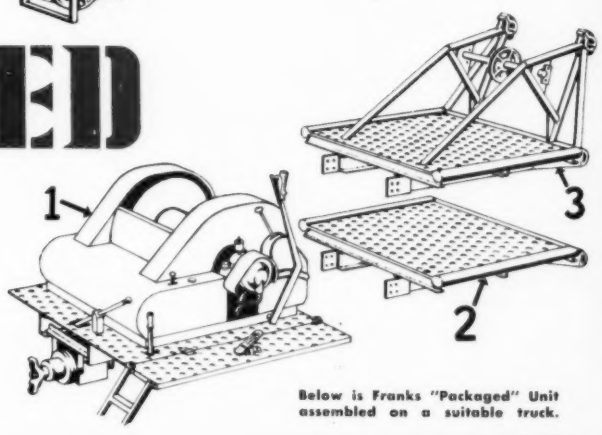
the OIL AND GAS JOURNAL

Now FRANKS MFG. CORP. WELL SERVICING AND DRILLING UNITS OFFERS

PACKAGED

SERVICING UNITS THAT FIT ANY TRUCK



Below is Franks "Packaged" Unit assembled on a suitable truck.

To facilitate faster delivery of servicing units to customers, Franks is now building "packaged" units which will fit any standard truck of adequate capacity and which can be installed in 12 to 36 hours.

The basic unit (see illustration No. 1) is a single or double drum hoist, including adaption frame, power take-off, gear shift, and operator's platform ready for mounting on truck. Optional items are: (No. 2) plain bed with tail roll; (No. 3) bed with mast supports and reeving sheave; (No. 4) single or double pole mast.

The unit is also adaptable for mounting on a suitable trailer. "Packaged" units are available for export shipment and can be easily installed by any competent mechanical crew.

Your Franks "packaged" unit is the same as those which have made Franks the leader in servicing unit equipment with contractors and companies the world over.

Franks "packaged" units are now scheduled on a continuous production line. For your particular size and model unit contact your nearest Franks representative (located in Odessa, Kilgore, Houston, Alice, Great Bend, Casper, Seminole, and Compton, California, as well as in Tulsa) and have him enter your order or give you more detailed information.

Write for the THING, Franks latest FIRST

FRANKS MFG. CORP. WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA
Box 3218

SAVE VAPOR WITH A HORTONDOME ROOF

The Hortondome Roof is one of the thriftiest vapor saving devices used throughout the petroleum industry. A typical installation is shown above at the Esso Standard Oil Company (Cuba) Belot refinery near Havana.

The Hortondome Roof is used primarily to reduce standing storage evaporation losses from cone roof tanks. It can efficiently serve a single tank or it can be the central unit of a vapor saving system consisting of several interconnected tanks.

Here's how the Hortondome Roof operates

There is a flexible, hemispherical membrane inside the Hortondome. The edge of this membrane is fastened to the Hortondome at its equator. When the atmospheric temperature rises, expanding vapors lift the membrane into the dome to provide the additional capacity needed. When the atmospheric temperature drops, the membrane returns to its original position. Vapor can not escape as long as the amount of expansion that takes place does not exceed the capacity of the Hortondome Roof.

The Hortondome Roof tank is only one of many Horton vapor saving tanks designed especially for use in the petroleum industry. Others include Hortonspheroids and Hemispheroids for the storage of less volatile liquids like motor or natural gasoline, Hortonspheres for pressure storage of highly volatile liquids and gases, and Horton Floating Roofs for efficient working storage.

For more complete information, write our nearest office. There is no obligation on your part.

CHICAGO BRIDGE & IRON COMPANY

What do his figures tell him about this rope ?

Since the day it was installed, he's kept a brief record of this wire rope's performance. The black book tells him the date it went to work, the type of work it's doing, and roughly just how much it does each day. When the rope is retired from service, he'll be able to say whether it's done a good job for him—given him his money's worth.

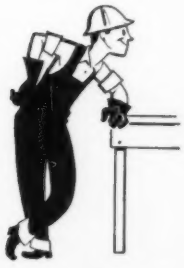
Smart man! For of course he isn't keeping tabs on just this one rope. He follows the system with all the major wire ropes he buys. And why? Because he learned years ago that you can't compare brands of rope by guessing—by vague, hit-or-miss estimates.

Bethlehem earnestly recommends that you, too, keep figures on rope performance. Nothing elaborate—something that costs you only a few minutes' time each day. You see, we're so confident of our own product, Bethlehem wire rope, that we'd like to have you check it yourself. Stack it against the competitive brands of your choice. Keep records on all of them!

When you've been doing it long enough to make a comparison, study those figures. They'll tell you that every dollar invested in Bethlehem rope is money well spent . . . that you can't buy finer rope anywhere.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation



LET YOUR RECORDS TELL YOU!

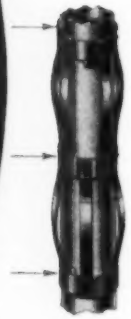
The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910 at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951

For *Maximum* Centering Efficiency..

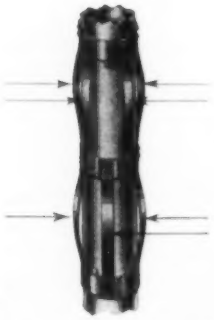
LARKIN CENTRALIZERS

The design of Larkin Casing Centralizers incorporates features that have been developed in pace with the increasing knowledge of centralizer requirements gained from field observation and laboratory testing on the part of Oil Company engineers.

Larkin Casing Centralizers are durably constructed to assure damageless passage down the well bore. The strong but resilient springs assure a maximum, unimpaired centralizing force regardless of the number of times they are deflected during downward passage. Larkin Centralizers are available "... Through Your Supply Store."



1. Larkin Centralizer springs are riveted, not welded, to end and center rings in order to avoid embrittlement at point of attachment.



2. Larkin Centralizers provide ten points of contact with the hole and are effective even when washed-out or key-seated conditions exist.

3. Casing may be freely rotated within centralizer without binding or sticking.

4. Installed simply by welding positioning lugs to casing.

LARKIN ...Through Your Supply Store

LARKIN PACKER CO., INC., ST. LOUIS, MO.

Only with B. F. Goodrich grommet belts can you make these savings!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

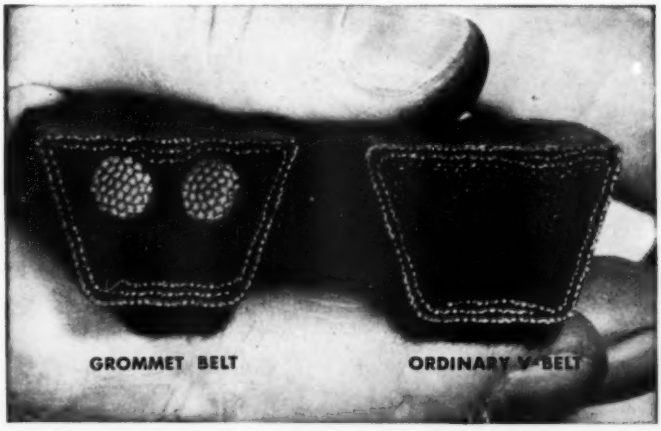
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. OJ-10
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

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You can SAVE $1200*

on equipment to pump a 5,000-ft. well

. . . by purchasing "OILWELL" PUMPING UNITS which are now designed with an offset saddle-trunnion assembly, illustrated above.

Together with "Oilwell's" TALLER samson posts and LONGER walking beams, this new feature provides an extended range of stroke lengths that often result in achieving the production you desire with:

- **SMALLER SUBSURFACE PUMP . . .** permitting the use of insert-type pumps which also reduce "pulling" costs.
- **SMALLER SUCKER-ROD AND TUBING STRINGS . . .** or extra service life from the same grades and sizes.
- **SMALLER REDUCTION-GEAR NEEDED . . .** resulting in lower initial costs of equipment.
- **LESS HORSEPOWER INPUT . . .** permitting the use of smaller engines or smaller electric motors with corresponding savings in fuel or current.

*** Average saving in cost by using smaller rods, smaller tubing, smaller gear and smaller pump with "Oilwell" Pumping Units in LONG STROKE position.**

Study . . . the selected set of conditions illustrated in the table below . . . then ask your "Oilwell" Representative to work out a long-stroke comparison based upon your own well conditions . . . and SEE FOR YOURSELF how much you can save by standardizing on "Oilwell" Production Equipment.

DEPTH OF WELL—FT.	STROKE LENGTH IN.	BORE OF ROD PUMP IN.	SUCKER RODS LENGTH—FT. X SIZE—IN.	TUBING SIZE IN.	STROKES PER MINUTE	A.P.I. PEAK POLISHED ROD LOAD LB.	PEAK TORQUE IN.—LB.	AVERAGE H.P. OUTPUT AT GEAR	COUNTER WEIGHT REQUIRED LB. EFFECTIVE AT POLISHED ROD	"OILWELL" UNIT REQUIRED	BARRELS PER DAY THEORETIC
5000	54	1¾	1650′ of ⅞″ 3350′ of ¾″	2½	16	16,634	*130,291	19.65	11,808	34E17	146
5000	64½	1½	5000′ of ¾″	2	16	14,235	**118,203	17.83	10,550	24E17	172

Slippage and Overtravel Neglected. Specific Gravity 1.
Torque Figured on 0.8 Fluid Weight x ½ Stroke x Impulse Factor.
*Requires an "Oilwell" D-34 Speed Reducer with a Peak Torque of 166,700 in.-lb.
**Requires an "Oilwell" D-24 Speed Reducer with a Peak Torque of 120,600 in.-lb.

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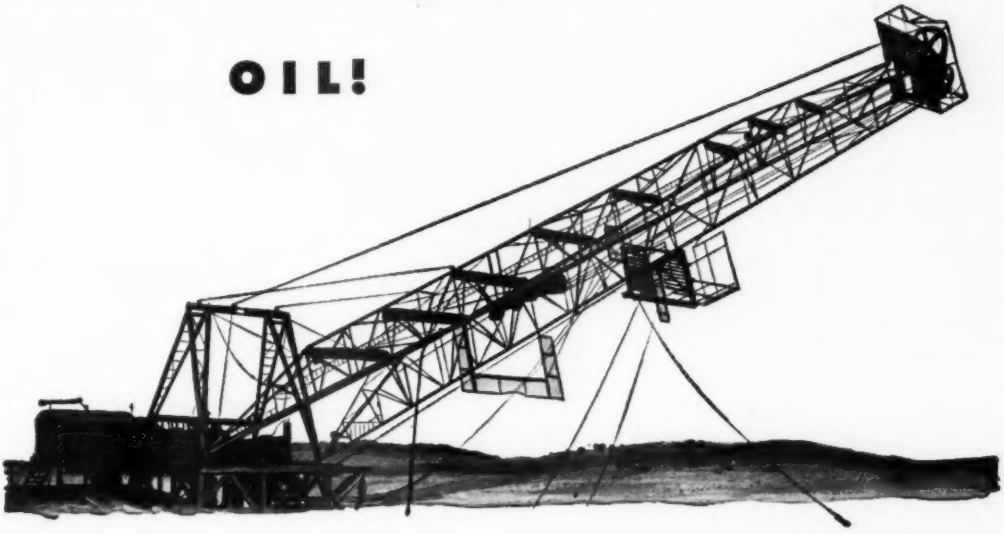
"OILWELL"

TRADE MARK

UNITED STATES STEEL

GROW WITH CANADIAN OIL!



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is an important factor in the development of Western Canadian oil. Many men now in the field were helped by our wealth of experience in handling the financial problems of the oil industry.

Oil men are invited to consult our Petroleum and Natural Gas Division at Calgary. Our "banker-geologist" team provides a service of unique value to those interested in the opportunities offered by this great oil field. Why not call on us?

"For Oil and Allied Industries", ...newly revised! Contains up-to-date information on Canadian exchange control; taxes; leases and reservations; customs regulations; a map of the oil and gas fields; and other material of interest. Write for your copy to-day.

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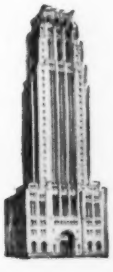

In this case it's refining, but whether the job be refining, pumping or transmission, you'll find Electric Power on the job — rendering safe, dependable, economical service. The top photo shows the new "cat" tower of a major oil company at Drumright, Okla. The bottom photo is a view of the refinery's storage facilities as seen from atop the tower. Here, as in countless other locales, Electric Power is doing the job Let *PEP go to work for you. Consult the Power Engineer of your nearest Electric Power Company for details on how you, too, can enjoy the many advantages of Electric Power.

*PEP — Purchased Electric Power

Petroleum Electric Power Association

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. . . That's why more Crane Valves are used than any other make

Crane Alloy Cast Iron Gate Valve, 18-8 Mo. trimmed. 200 Pounds W.O.G.

High Corrosion Resistance at Low Cost

Crane No. 14477 Alloy Cast Iron Gates give excellent service where "all-iron" or "brass trimmed" valves fail, due to corrosion of seating surfaces. Body rings, stem, and disc-faces are Crane 18-8 Mo. Conditions permitting, these valves, with low nickel alloy cast iron body, are ideal substitutes for hard-to-get, more expensive, all 18-8 stainless steel valves.

O.S. & Y. design keeps stem threads from contact with line fluid; straight through ports assure unrestricted flow, minimize turbulence and corrosive action. Extra-long guides keep disc travel true.

Your Crane Representative will gladly show you why Crane Valves give better performance at lower ultimate cost—why you should insist on Crane Quality.

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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For The First Time Paraffin Controlled From The Surface

THE days of shutdowns, rod-pulling, steaming and un-jointing of pipe to remove paraffin from rod wells, flowing wells and surface lines have passed into oblivion. This troublesome, costly practice went 'out the window' with the perfection of the Kinney Soluble Plug Injection System—a method of keeping tubing and flowlines free of paraffin through inexpensive stationary surface control.

This system is so simple, practical and economical that it has gained enthusiastic acceptance by Majors and Independents alike in the Gulf Coast, Mid-Continent, Rocky Mountain and foreign areas. To date, NOT A SINGLE KINNEY PLUG INJECTOR HAS BEEN REMOVED BECAUSE OF DISSATISFACTION!

Heart of the Kinney System is a plug injector valve through which soluble plugs may be inserted while the well's production is being bypassed through a built-in orifice. After the plug is inserted the valve is turned so that the plug is free to travel through the tubing or flowline, pushing paraffin deposits before it. The plug, being hard enough to mechanically keep the paraffin from depositing, is soluble in oil and goes into solution after it has served its purpose. It will withstand temperature up to 150 degrees without changing its shape.

Pumper engaging head Kinney Hydraulic Pump to Pump Jack on major oil company well in West Texas.

As shown on the diagram, the small string of tubing is set below the point where the paraffin will accumulate. This tubing becomes the production line. The fluid in the regular production tubing above the parallel crossover becomes "dead" and does not experience any accumulation of paraffin in that area after the hookup is made. Thus the rod as well as the wall of the 2" tubing is free of paraffin.

The 2½" hydraulic pump, which is adjustable to fit any size pumping unit, is designed to operate only when injecting plugs into the well. The connecting head of the hydraulic pump is easily engaged or disengaged by merely slipping or pulling it from a slot. When the pumping pressure builds up due to the paraffin accumulation in the small production line it is reflected on gauge (Fig. 6). A Kinney soluble plug is injected in the valve (Fig. 5), the hydraulic pump (Fig. 1) is connected to the pumping unit and the plug is forced down the tubing below the paraffin line but safely above the opening of the main tubing. When the Hydraulic pump is cut off, the pressure is then reversed and the plug carried up through the tubing and out into the flowline.

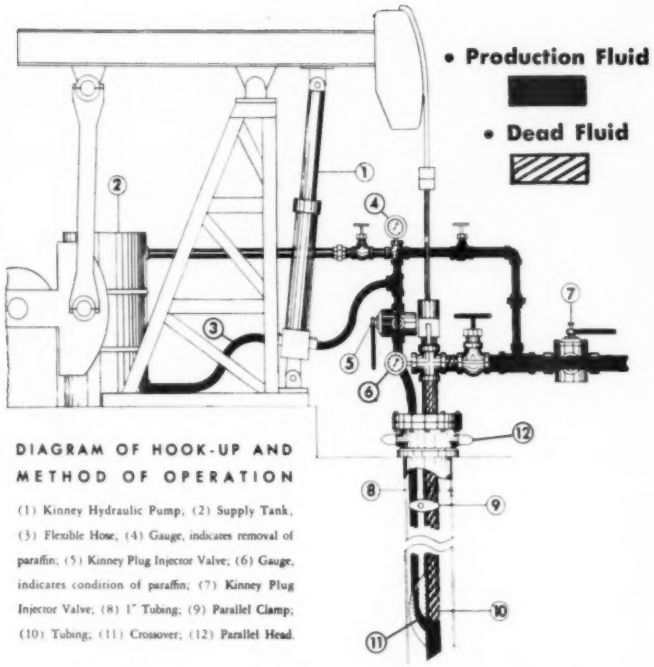
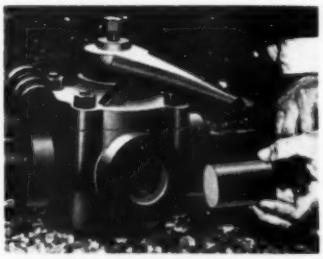


DIAGRAM OF HOOK-UP AND METHOD OF OPERATION

(1) Kinney Hydraulic Pump; (2) Supply Tank; (3) Flexible Hose; (4) Gauge, indicates removal of paraffin; (5) Kinney Plug Injector Valve; (6) Gauge, indicates condition of paraffin; (7) Kinney Plug Injector Valve; (8) 1" Tubing; (9) Parallel Clamp; (10) Tubing; (11) Crossover; (12) Parallel Head.



Soluble Mechanical Plug being inserted in Kinney Plug injector valve.

The entire Kinney System is complete and available for easy installation. Instructions for installing are furnished and are easy to follow. Once the system is installed all that is necessary to keep the tubing and flowlines free of paraffin is to insert a soluble plug at the proper intervals. The average cost of plugs after Kinney Plug injection system is installed amounts to about $1.60 per month. Flowing wells are now being controlled by using Kinney Differential Pressure System between casing and tubing at a cost of approximately $200.00 per well and $1.60 per month for plugs.

Illustrated, informative literature, together with cost estimates will be furnished by Kinney, Inc., P. O. Box 3426, Odessa, Texas.

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MORE ECONOMY
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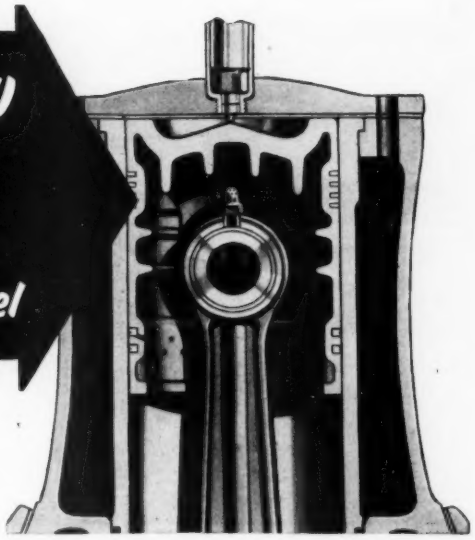
GREATER DEPENDABILITY
EASIER STARTING

because it's a "True" Diesel



ILLUSTRATED at the right in cross section is the combustion chamber of the Murphy Diesel. Note that it is plain and open with no artificial devices to effect combustion. In operation, completely atomized liquid fuel is sprayed directly into all parts of the air charge by means of the unit injector located in the center of the combustion chamber. Since the fuel burns immediately upon injection into the incandescent air charge, combustion is controlled solely by the unit injector, which in turn is precisely controlled by the hydraulic servo-type governor. This is "true" diesel operation.

To the Murphy owner it means more power from each drop of fuel and less wear and tear on the engine . . . lower costs in all ways.

More details on "true" diesel operation as well as other Murphy features are given in the booklet "10 Questions to Ask a Diesel Engine Salesman." Ask your Murphy Diesel Dealer for a copy or write direct.

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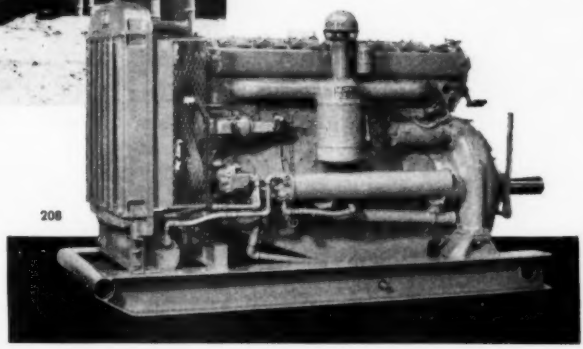
Illustrated is a Unit 15 rig and Emsco mud pump powered by three Murphy Diesels each rated at 160 H.P. continuous, 180 H.P. intermittent. When photographed, the rig, which is owned by Aztec Drilling Co., was drilling for natural gas in the vicinity of Lindreth, New Mexico.

MURPHY DIESEL

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.



208

HELPING AMERICA BUILD FASTER

To keep us better informed—newspaper-owned Beechcrafts

WHEN Beechcrafts go "on the staff" of a publisher, key men *really* get around. And the front page reflects it. News is covered better and faster. Public service missions are routine. This Model C35 Beechcraft Bonanza carries four big men plus photographic equipment, cruises at 175 mph. So *more* gets done when time in transit is slashed as much as 75%.

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— which has been acclaimed thruout the process industry as *the successor to the bubble tray.*

You will be interested in this brochure telling how and why consistently higher capacities and efficiencies are obtainable.

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THIS IS AN

"Exploratory"

ADVERTISEMENT

Frankly, we don't know what uses there are for the "Utiliscope" (Wired Television) in the oil industry . . . so in the adjacent ad we are simply telling you what it will do. Based on our experience in other fields, we suspect there are many places in the petroleum industry where the "Utiliscope" will improve product quality, save manpower, prevent accidents or help increase production.

If you want to look into the possibilities of the "Utiliscope", simply write us for a copy of Bulletin 1025A which explains the equipment and shows various applications. Please address your request to Department "A".

DIAMOND POWER SPECIALTY CORPORATION
Department "A"
Lancaster, Ohio

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The DIAMOND "UTILISCOPE"

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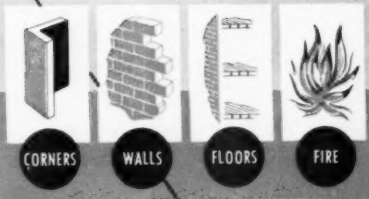
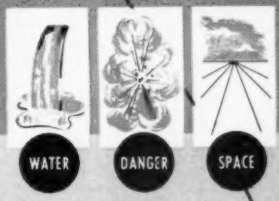


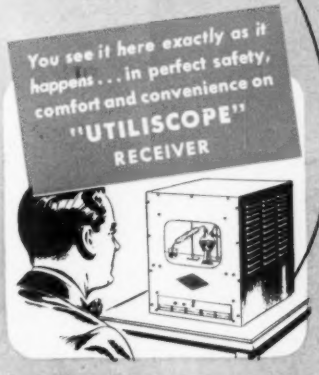


These Are *NO LONGER* Obstacles to Seeing Exactly What Is Happening

"he Diamond "Utiliscope" (television which transmits by wire instead of by broadcast) provides a clear, faithful, instantaneous reproduction at a distance of any operation, scene or demonstration. The image can be brought right to the control panel, or desk of the operator or supervisor. Obstacles that prevent direct observation (such as danger, distance, building members, etc.) are not obstacles to the "Utiliscope" which enables you to "SEE where you can't LOOK." There is no measurable time lag and the "Utiliscope" cannot give incorrect information.

The "Utiliscope" is surprisingly simple . . . has fewer tubes than a good radio. No special skill is required for installation and operation. Stability and reliability are exceptional . . . and the cost is very moderate.

The "Utiliscope" is now in continuous use (24 hours a day) saving labor, improving product quality, preventing accidents and increasing production. Let us tell you about some of these installations that may suggest solutions to your own problems . . . write for Bulletin 1025.



TYPICAL USES— Studying destructive tests of engines • Watching flow of molten steel • Checking remote gauge readings • Observing conditions inside furnaces • Viewing nuclear research • Coordinating materials flow on conveyors.

The "Utiliscope" (Registered U. S. Patent Office)

4538

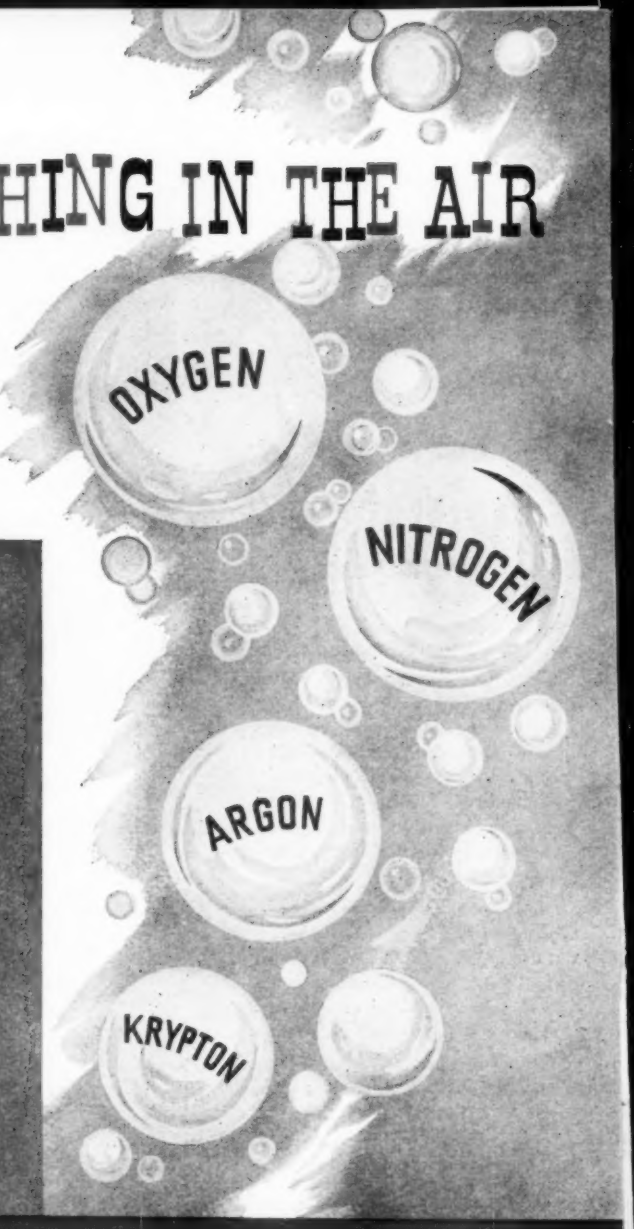
DIAMOND POWER SPECIALTY CORP.
FIRST IN INDUSTRIAL TELEVISION
LANCASTER, OHIO • *OFFICES IN 39 PRINCIPAL CITIES*
Diamond Specialty Limited — Windsor, Ontario

WRITE FOR BULLETIN 1025

Since 1903, Diamond has Manufactured Quality Equipment For Industry

THERE'S SOMETHING IN THE AIR

...that you can make a profit on!



All of the valuable components in the air you breathe can be separated for industrial use in high purity.

OXYGEN for steel production, non-ferrous metallurgic welding and cutting, synthetic fuels and chemical processes;

NITROGEN for synthetic ammonia and inert atmospheres;

ARGON for shielded arc welding;

ARGON and **KRYPTON** for incandescent lamps.

Complete plants, using processes based on the developments of Gesellschaft fuer Lindes Eismaschinen, A. G., for producing these gases singly or in combination are furnished to fit your requirements.

Blaw-Knox also furnishes complete Linde plants for the separation of industrial gases such as coke oven gases, natural gas containing nitrogen, purged gases from ammonia synthesis, nitrogen-hydro-carbon mixtures, cracked refinery gases and mixtures of hydrogen or carbon monoxide.

CHEMICAL PLANTS DIVISION

BLAW-KNOX CONSTRUCTION COMPANY

PITTSBURGH • TULSA • NEW YORK • PHILADELPHIA
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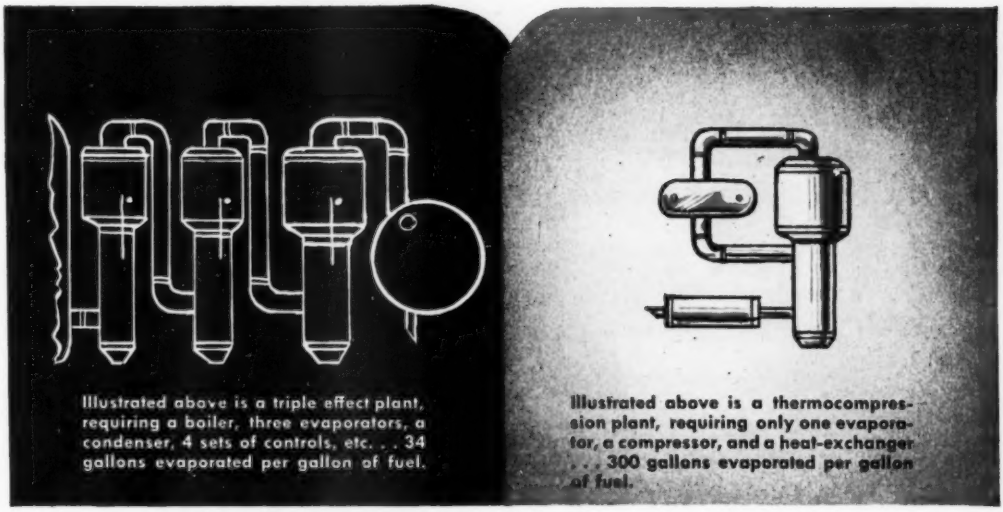
The difference between Night and Day



Illustrated above is a triple effect plant, requiring a boiler, three evaporators, a condenser, 4 sets of controls, etc. . . 34 gallons evaporated per gallon of fuel.

Illustrated above is a thermocompression plant, requiring only one evaporator, a compressor, and a heat-exchanger . . . 300 gallons evaporated per gallon of fuel.

with MECO THERMOCOMPRESSION EVAPORATORS

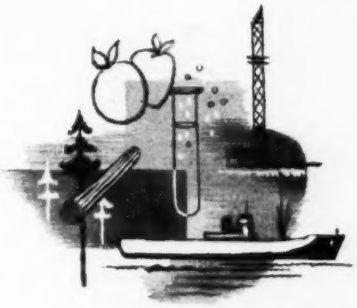
lower cost — much greater efficiency!

LOWER FUEL COST

No matter what the job is—evaporation for concentration or distilled water production—you will find that MECO thermocompression evaporators do the job better at less cost! For instance, one MECO unit is equivalent in efficiency to a 27 *effect*, multiple effect conventional plant . . . can make *pyrogen free*, chemically pure water.

LOWER OPERATION & MAINTENANCE COST

The higher the efficiency, the fewer the components, the more simple in principle the machine is—the less the cost of operation! Our brochure will describe principles of MECO thermocompression evaporation and the reasons why it will keep the operating cost of your job down, way down! MECO's working parts are so few and so easy to keep up that an average mechanic can do it with ease. High quality design insures long life.



Sea water for distillation for the oil industry . . . Concentration for the Chemical industry . . . uses in the paper, fruit juice and many other industries.

MECO

MECHANICAL EQUIPMENT CO., INC.

NEW ORLEANS, LOUISIANA

This equipment is built under various patents belonging to Mechanical Equipment Company, and Arthur D. Little, Inc.

MECHANICAL EQUIPMENT CO., Inc.
861 Carondelet St.
New Orleans, La.

Please send me bulletin concerning MECO thermocompression evaporation units.

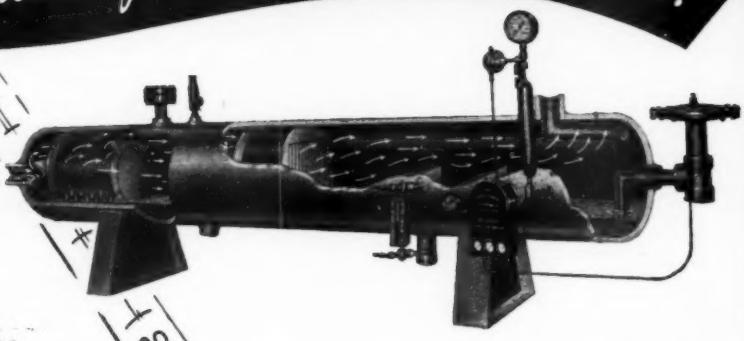
Name _____

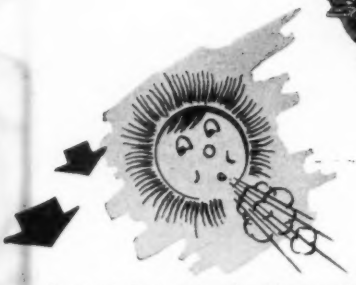
Address _____

PARKERSBURG...

SINGLE TUBE HORIZONTAL SEPARATORS

Operate Safely at Lower Temperatures!



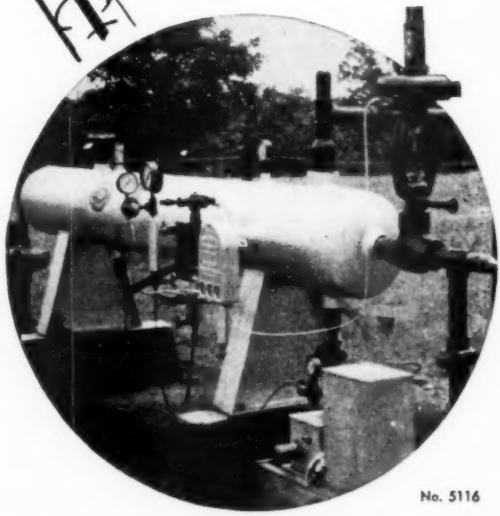


Parkersburg Horizontal Separators are designed to handle any type of fluid . . . heavy, light and foamy with maximum efficiency and dependability, but are particularly recommended for handling light, foamy crudes and condensates. They do the basic jobs of either a gas distillate separator or an oil and gas separator.

Last winter's record cold proved Parkersburg Horizontal Separators have an important money and trouble saving plus value. With the warm gas and separated liquids contained in the same shell, the separated liquids run a temperature 15 to 20 degrees higher than ordinary twin tube separators. These extra degrees of temperature, provided in the warm gas, helped prevent freezing during the severe cold weather.

The extra large shell diameter combined with the shape and internal elements of the Parkersburg Horizontal Separator, provides greater facility for natural separation than other horizontal separators of the same capacity. The exclusive Parkersburg No-Bleed Level Controller, controls the liquid level within an extremely small range to maintain perfect balance between retention time for the liquid and velocity of the gas to obtain maximum separation.

Specify Parkersburg Horizontal Separators for superior performance. Your Parkersburg Representative will gladly furnish complete data on the separator required for your type of fluid.



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PARKERSBURG RIG & REEL CO.
PARKERSBURG, WEST VA.

PARKERSBURG

PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

PETROLEUM CHEMICALS DIVISION
NEWS

October ★ One of a Series of Interest to the Petroleum Industry ★ 1951

SALUTE TO THE PETROLEUM INDUSTRY ON OIL PROGRESS WEEK

Just as Spindletop roared in with a mighty gusher 50 years ago, so has our modern civilization—powered by petroleum products—surged ahead.

More and better petroleum products have paved the way to progress in industry, in transportation, in farming, in home conveniences. And today, such revolutionary products as detergents, plastics and synthetic rubber play an important role in our everyday life—thanks to the basic materials supplied by an alert, progressive petroleum industry.

Du Pont is proud of its contributions to oil progress, too . . . with explosives, paints, neoprene and many other products . . . and proud of its work with refiners in developing additives that make for superior fuel performance.

Du Pont "Zerone" and "Zerex" Formulated to Meet Varying Customer Needs

Climate, altitude, driving conditions and mechanical design of the car all have a bearing on the type of anti-freeze a motorist needs for efficient cooling system operation. That's why Du Pont makes two distinctly different types of anti-freeze—"Zerone" and "Zerex." Both are well known to millions of motorists the country over.

"Zerone" is made to meet the requirements of 4 out of 5 motorists for complete winter protection. It contains a chemical-type rust inhibitor to protect the radiator from corrosion.

"Zerex" is specially made for such extraordinary conditions as high opening thermostats, high altitudes, heavy-duty driving and temperatures colder than 30°F. below zero. Its chemical rust inhibitor helps to keep the entire cooling system clean and free from rust and corrosion.

In addition, Du Pont has prepared a cooling system manual to help service station operators build additional business with a complete cooling system service. It deals with many common cooling system problems and gives complete instructions for both summer and winter conditioning. The manual is available through wholesale distributors of "Zerone" and "Zerex."

Broad Petroleum Additives Program Aims at Providing Maximum Assistance for Refiners

How CAN Du Pont's extensive chemical research and manufacturing experience be of greatest help to the refinery industry?

The answer to that question, posed more than a quarter century ago, ultimately led to Du Pont's development of a complete line of gasoline additives . . . tetraethyl lead compounds, dyes, antioxidants and Metal Deactivator. In addition, Du Pont set up a broad service program to help refiners and marketers obtain maximum uniformity, economy and efficiency in the use of these additives.

THE JACKSON LABORATORY, located near the Du Pont Chambers Works TEL manufacturing area, was the scene of many early developments in TEL and other petroleum additives.

Du Pont's close cooperation with the petroleum industry started on additive problems back in the early 20's with the development of tetraethyl lead. The safe commercial manufacture of this important antiknock compound was first accomplished by Du Pont scientists and, until recently, Du Pont was the sole manufacturer of this product.

At about the same time, dyes also became an important factor in gasoline marketing. This was brought about in part by the Surgeon-General's recommendations that gasoline containing TEL must be identified by distinctive coloring.

Since Du Pont had been developing dyes as early as 1915, when World War I cut off the German supply, the Company was again able to make a substantial contribution to the petroleum industry. For Du Pont had already poured millions of dollars and years of research into the task of perfecting uniform, economical dyes for many uses.

Today, Du Pont manufactures and sells gasoline dyes conforming to the rigid standards that have been established through many years of research and experience.

But Du Pont's interest in gasoline additives did not stop with TEL and dyes alone. The problem of keeping cracked gasolines gum-free during long periods of storage brought about the development of Du Pont Gasoline Antioxidants. Sulfuric acid, both costly and contributing to treating losses, had previously been used for this purpose. With antioxidants, however, due to

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED *Additives Program*

their effectiveness even in small concentrations, refiners were able to produce finished gasoline at lower treating costs.

Today, antioxidants are almost as important to the production of high quality gasoline as is tetraethyl lead. And they are especially important to the defense effort because of the oxidation problems involved in stockpiling gasoline.

Still alert to problems and desired improvements in refining, Du Pont added Metal Deactivator to its line. Until 1937, there had been little need for this product. Then copper sweetening came into the picture. This was a distinct advance in refining, but, unless handled with care, traces of copper might remain in the sweetened gasoline. This copper is a highly active catalyst in the oxidation of the unsaturated constituents in the end product.

Obviously, there was a need for deactivating even minor traces of copper—and Du Pont Metal Deactivator met this need. Thus more refiners have benefited from the advantages of this process.

Du Pont has set up a complete program of technical services for the petroleum industry with a large staff of competent personnel especially trained in the use of all gasoline additives. Services also include promotion and dealer training aids for marketers, as well as safety, medical and research help for refiners. And besides specialized work on fuel and lubricant problems at the Petroleum Laboratory, Du Pont petroleum chemicals are backed by broad Company research facilities, that rank with the most extensive in the world.

SINCE 1923, Du Pont has manufactured TEL in these buildings at the Chambers Works, Deepwater, N. J. Here, the first safe method of producing tetraethyl lead compounds was accomplished on a commercial scale.

PIONEER IN GASOLINE ADDITIVES RESEARCH

FREDERIC BAXTER DOWNING is assistant director of the Jackson Laboratory. He is one of the many Du Pont men who worked on the early development of gasoline additives. Today, he directs the research group working on tetraethyl lead, and other groups engaged in research work on neoprene, fluorine and general organic chemicals.

Before joining the Du Pont Company in 1917, he was a chemist with the Aluminum Company of America and the Champion Fibre Company of Canton, North Carolina.

Mr. Downing graduated from Cornell University in 1916 with a B.S. in chemistry. He is a member of the Society of Automotive Engineers, as well as the American Chemical Society, the American Assn. for the Advancement of Science and the Franklin Institute.

Frederic B. Downing

Reprints of Du Pont Paper on "Antiknock Antagonists" Now Available

Reprints of a paper "Antiknock Antagonists," which appeared in the March 1951 issue of Industrial and Engineering Chemistry, are available through Petroleum Chemicals Division district offices. The paper was prepared by H. K. Livingston of the Du Pont Jackson Laboratory.

In the paper it is stated that the antiknock efficiency of tetraethyl lead and related compounds is decreased by antagonists which limit the utility of the antiknocks and lead to economic waste, unless the nature of the antagonists is recognized and their concentrations in gasoline are reduced to the minimum.

A proposed mechanism of antiknock action shows which compounds will have a harmful effect on the octane number of leaded gasolines and permits prediction of the economic advantage to be expected from their removal. The proposed mechanism also provides a basis for further work leading to an ultimate understanding of the chemical processes involved in the knock phenomenon and in knock suppression by chemical antiknocks.

LITERATURE AVAILABLE

The following is a partial listing of many Du Pont bulletins, reports, technical papers, booklets and other aids available to you. Address requests to your nearest Du Pont Petroleum Chemicals Division District Office.

Antiknock Antagonists—by H. K. Livingston, Jackson Laboratory.

Possible Mechanisms By Which Combustion Chamber Deposits Accumulate and Influence Knock
Serial A-2087a

Tank Talk — a 52-page booklet which outlines safe procedure for cleaning gasoline storage tanks. Written for the man who does the cleaning.
Serial A-1134

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Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
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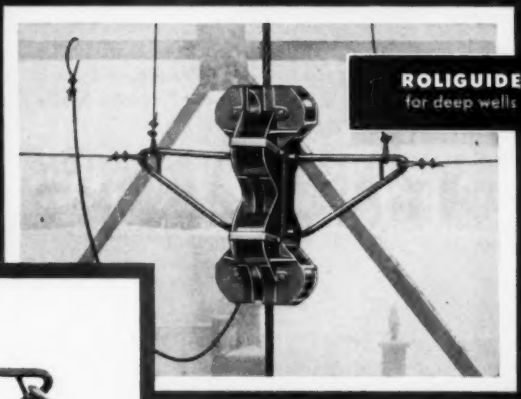
a whipping line spells

WEAR



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for deep wells

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for average depth drilling

- **Absolutely safe**—designed so that rollers cannot fall out of guide body.
- Eight rollers contact the line for positive stability.
- Whip absorbed by rollers is transmitted to the guide body and hanging assembly.
- **Non-clogging,** solid rubber rollers in steel body cannot throw oil on crew.
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Available Through Your Supply Store

WIRE LINE FAILURE due to whipping and vibration spells danger to your crew. But a PB Wire Line Guide absorbs whiplash and traveling waves...prevents excessive wear due to uneven spooling and piling up on the drum...saves fast sheave of crown block from side wear on groove.

Protect your crew, protect your investment with a PB Wire Line Guide. See or call your nearby PB field representative today.

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In all types of lines... *everywhere*

REPUBLIC ELECTRIC WELD LINE PIPE goes together fast because it is *uniformly round, uniform in diameter, uniform in wall thickness.* It carries pressures safely because of its *uniform high yield strength.* It bends easily because it's made from *high ductility steel. Welds readily* because carbon content is low. *Free from scale* that might clog valves or contaminate products. Comes in *long lengths* that move jobs in bigger strides. *Inspected inside and out* to protect against possible hidden defects.

And, proved dependable by the more than 59,000 miles used for transmission, distribution, collecting and product lines during the past 22 years. Write for literature.

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GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

SCRAPPY SAYS:
AID DEFENSE
MORE SCRAP TODAY...
MORE STEEL TOMORROW

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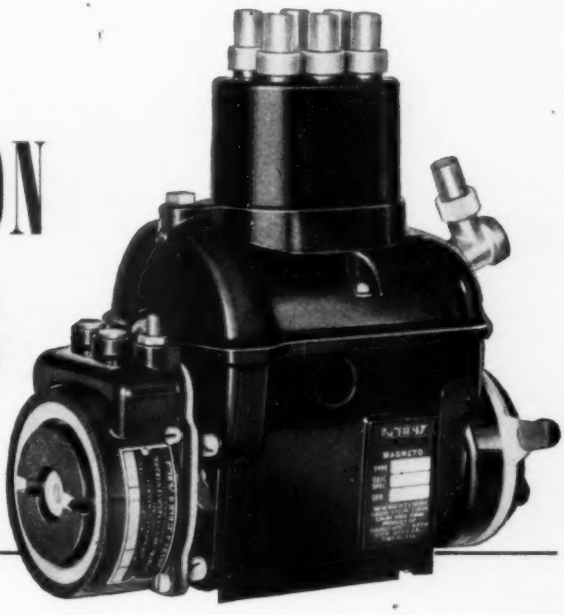
Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

For Sky-High Quality...

and Down-to-Earth Performance...

BENDIX LOW-TENSION MAGNETOS



CONTROL EXPLOSIVE FUMES with FLAME-PROOF VENTILATION!

The Scintilla Magneto Division of the Bendix Aviation Corporation, foremost producer of low tension ignition systems for the aviation industry, now manufactures this same system to fully meet an important safety requirement of the petroleum industry's engine operations. For example, a special ventilating arrangement permits even air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

With the Bendix Low-Tension Magneto, spark plug erosion is reduced to a minimum and variable or fixed ignition can be obtained by internal adjustment. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with a conventional distributor.

For safety and low operating costs be sure to specify Bendix Low Tension for your magneto requirements. Complete data available on request.

- Low Plug Erosion Rate
- Breaker Type Distributor
- Ventilation without Fire Hazard
- Radio Shielding Available
- Variable or Fixed Ignition

Bendix

SCINTILLA MAGNETO DIVISION OF SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

FACTORY BRANCH OFFICES:
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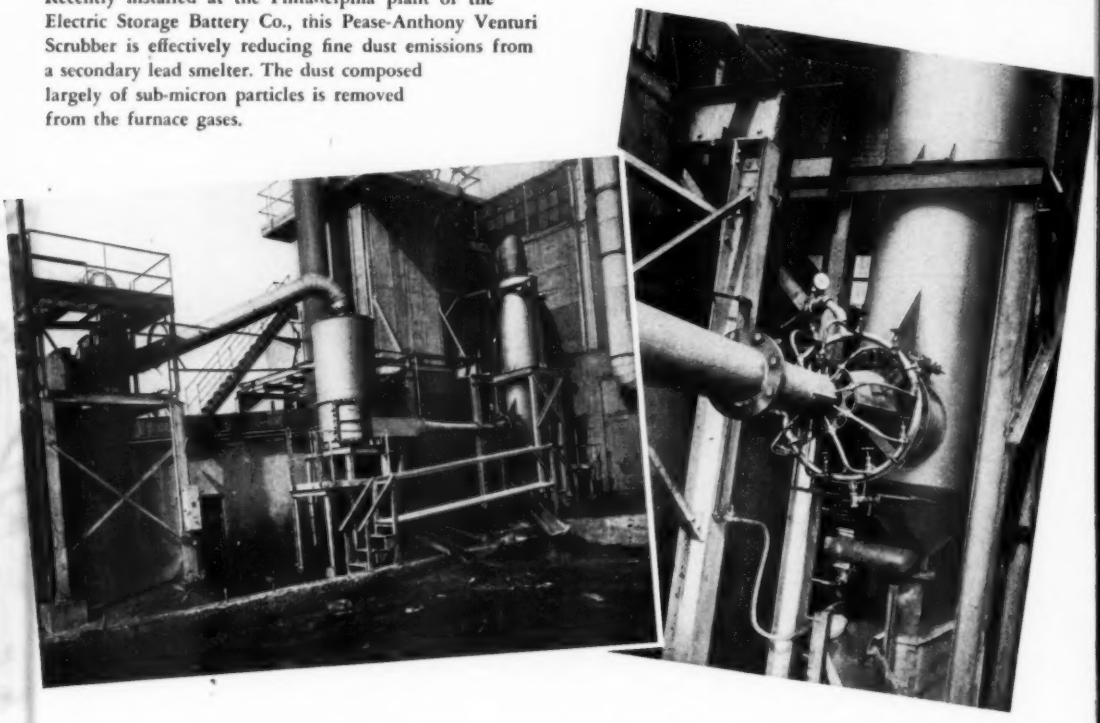
Brouwer Building, 176 W. Wisconsin Avenue, Milwaukee, Wisconsin · 582 Market Street, San Francisco 4, California

Here's Efficient **DUST** and **FUME** Removal

Recently installed at the Philadelphia plant of the Electric Storage Battery Co., this Pease-Anthony Venturi Scrubber is effectively reducing fine dust emissions from a secondary lead smelter. The dust composed largely of sub-micron particles is removed from the furnace gases.



Other Typical Applications

Chemico P-A Venturi Scrubbers are now being used in a wide range of industries for the highly efficient removal of micron and sub-micron dusts and fumes. For a detailed analysis of your scrubbing problem, write or call our P-A Sales Department.

APPLICATION	MATERIALS BEING REMOVED	DUST AND FUME LOADINGS Inlet to Scrubber	Outlet from Scrubber
DUSTS			
Diatomaceous Earth Plant	Diatomaceous Earth	1.3 grains/scf	0.05 grains/scf
Rubber Blenders	Carbon Black	0.3 grains/scf	0.003 grains/scf
Yellow Brass Foundry Furnace	Zinc Oxide	3.5-10 grains/scf	0.7 grains/scf
Lime Kilns	Lime and Na_2O Fumes	7.0 grains/scf	0.02 grains/scf
Electric Furnace Fumes	Iron Oxide	0.2 grains/scf	0.03 grains/scf
Blast Furnace	Iron Oxide	4.0-20.0 grains/scf	0.008-0.08 grains/scf
Secondary Lead Blast Furnace	Lead and Rubber Compounds	1-10 grains/scf	0.05-0.20 grains/scf
FUMES			
Copperas Roasting Plant	H_2SO_4 Mist	100-300 Mg/scf	1-5 Mg/scf
Titanium Plant	H_2SO_4 Mist	120 Mg/scf	2.0 Mg/scf
Phosphoric Acid Plant	H_3PO_4 Mist	100-300 Mg/scf	3.0 Mg/scf
Wood Distillation	Tar Fog and Acetic Acid Mist	1000 Mg/scf	10-40 Mg/scf
Enamel Smelting Furnace	Dust and Fluoride Fumes	55.0 Mg/scf	4.0 Mg/scf
Dry Ice Plant	Amine Fog	25.0 Mg/scf	5.0 Mg/scf

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

EUROPEAN TECHNICAL REPRESENTATIVE

CYANAMID PRODUCTS, LTD., NORTH WEST WING, BUSH HOUSE

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Chemico plants are profitable investments

CC 554

What a Record!

MORE THAN TWO YEARS WITHOUT A "TURNAROUND"!

That's the outstanding initial performance record of this "cat cracker" at the Cities Service Oil Company's refinery, East Chicago, Indiana. Here Consolidated Safety Relief Valves again proved their absolute protection against overpressures in processing equipment.

Leakage under discharge piping stresses is eliminated because of the outside bevel seat and floating guide construction of these valves. The method of establishing the outside bevel seat permits the disc to be moved on a radial seating surface. Complete tightness is assured in all positions within the deflection range, under all conditions of service.

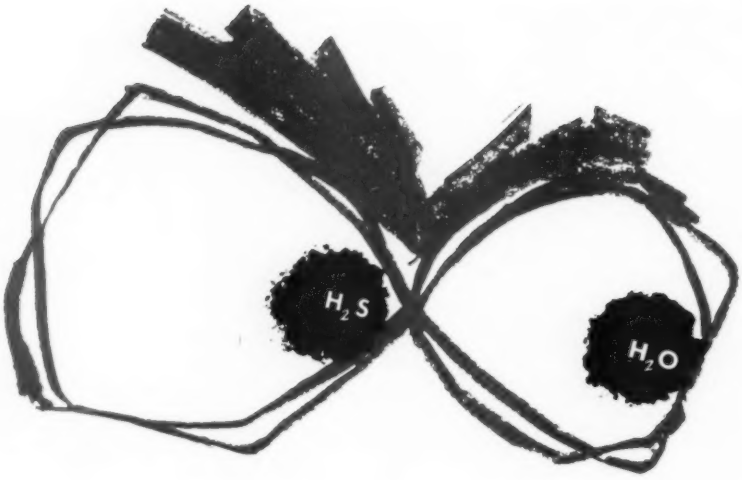
Designed with 25% fewer parts, Consolidated Safety Relief Valves simplify servicing, minimize standardization problems, reduce maintenance costs. Working parts cannot become misaligned — continuous performance is assured at the rated capacity.

Growing defense and civilian needs are crowding refinery capacity. So—depend on Consolidated Safety Relief Valves to help you stretch the time between turnarounds. There's no better valve investment to safeguard life, property and continuous production. Your local distributor will gladly tell you all about these economical, long-life safety relief valves.

CONSOLIDATED SAFETY RELIEF VALVES

A product of **MANNING, MAXWELL & MOORE, INC.** TULSA, OKLAHOMA

MAKERS OF 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS 'HANCOCK' VALVES, 'ASHCROFT' GAUGES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



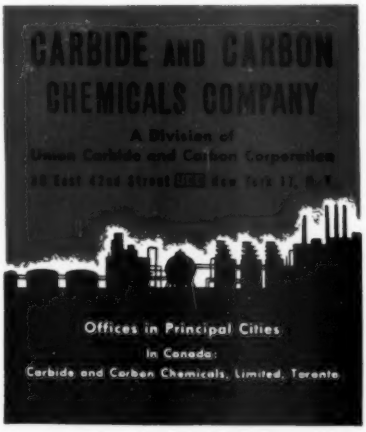
H_2S and H_2O need not cause you any Woe...

When you use	To remove
MONOETHANOLAMINE or DIETHANOLAMINE	H_2S
DIETHYLENE GLYCOL or TRIETHYLENE GLYCOL	H_2O

More corrosive hydrogen sulfide is being removed from hydrocarbon gases with monoethanolamine and diethanolamine than by any other method. Some companies are even realizing a profit from this impurity by converting it to elemental sulfur or selling it as concentrated H_2S.

And water can readily be removed from high pressure transmission lines with diethylene glycol and triethylene glycol. Thus you maintain capacity and avoid pipe line and regulator clogging.

Twenty years ago the introduction of monoethanolamine, diethanolamine, diethylene glycol, and triethylene glycol by Carbide and Carbon Chemicals made possible efficient and economical methods of removing H_2S and water from hydrocarbon gases. During this period we have compiled considerable data on the properties and use of these helpful chemicals. If you are constructing new facilities, or are replacing, enlarging, or modernizing your present equipment, we believe these data will save you time and money.


CARBIDE AND CARBON CHEMICALS COMPANY
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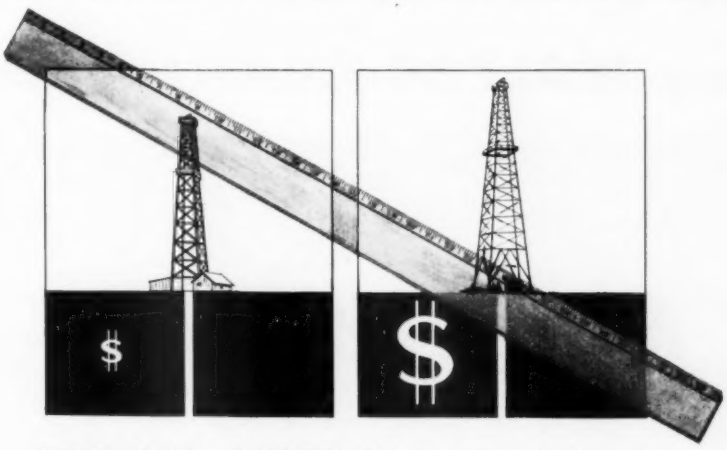
BY ANY YARDSTICK... CEMENTING PRICES ARE LOW



DRILLING COSTS

Writing in a leading oil journal, a production executive of one of the world's largest oil companies makes the statement that "the average well-drilling costs have more than doubled in the last 10 years." The increase, he says, is the result of higher wages, higher investment costs of equipment, higher cost of materials and supplies, and the greater average depth of wells.

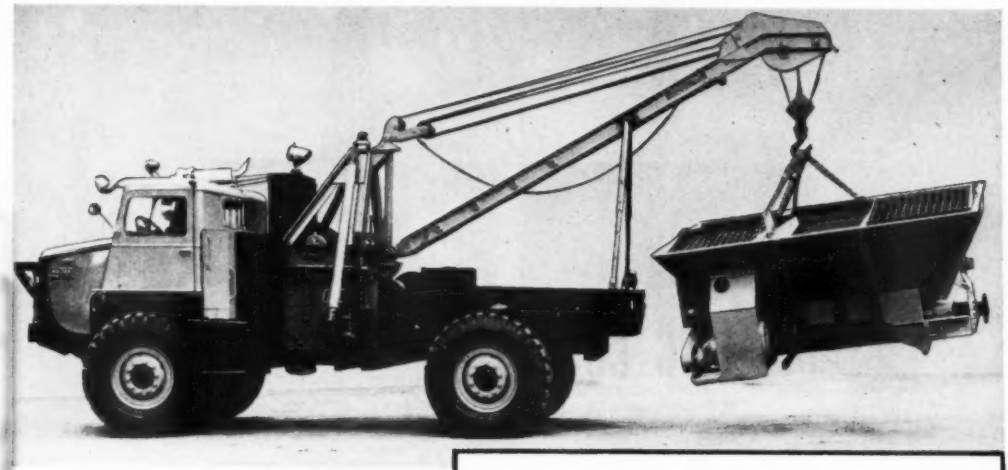
Although affected by the same conditions, the price of cementing has risen only slightly in the same period and is, in fact, lower today than it was in 1924.

By any yardstick, Halliburton cementing prices are low.

Erle P. Halliburton
Chairman of the Company
HALLIBURTON OIL WELL CEMENTING CO.
Duncan, Oklahoma

You'll find countless oilfield jobs for this versatile

New WALTER CRANE TRUCK



A fast, mobile combination with the ability to lift and carry heavy loads over soft, rough ground conditions

THE new Walter Crane Truck keeps busy the year 'round on toughest hauling — pulling — lifting — loading — and emergency jobs. The Walter 4-Point Positive Drive provides 100% traction in four driving wheels to travel mud, sand, soft ground, slippery surfaces under full load, without bogging down. Large, single 16:00 x 24 tires increase rolling ability.

Equipped with 10-ton, 18 ft. telescoping boom crane (opens to 25 ft.) and a 20-ton power winch, with 500 ft. of wire rope. Boom and winch permit objects to be pulled up to the unit, raised and carried as may be required, in difficult running conditions. Steel platform carries other materials. In winter, may be equipped with plows and wings for outstanding snow removal.

Compact WALTER OILFIELD TRACTOR gets to any location

A "little giant" with 125 h.p. and 100% four-wheel traction that gets servicing equipment through toughest running conditions. Fast traveling, turns on a dime, 16,000 lb. g.v.w. Get details.

Get complete specifications from your distributor listed below—or write us.

WALTER MOTOR TRUCK COMPANY
1001-19 Irving Avenue, Ridewood 27, Queens, L. I., N. Y.
In Canada: Walter Motor Trucks of Canada Ltd., 46 Elgin St., Ottawa, Ontario

WALTER
4-POINT POSITIVE DRIVE
TRACTOR TRUCKS

Distributors

EAST
J. F. Brittain
3001 Glenwood Park Ave., Erie, Pa.
Clyde W. Beckner, Inc.
219 Virginia St., W., Charleston, W. Va.
Dow & Company
1820 Elmwood Ave., Buffalo, N. Y.
Equipment & Supply, Inc.
624 Grant Bldg., Pittsburgh, Pa.

COLORADO
Western Machinery Co., Denver

ARIZONA
Western Machinery Co., Phoenix

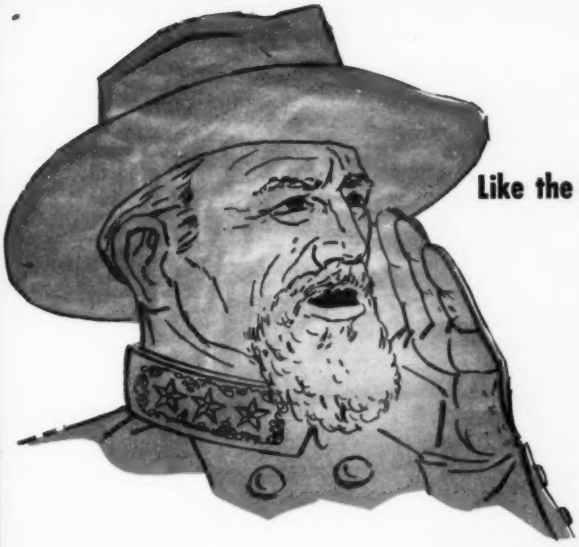
TEXAS
Plains Machinery Co.
P. O. Box 288, Amarillo, Tex.

CALIFORNIA
Edward R. Bacon Co.
17th & Folsom St., San Francisco
Shaw Sales & Service Co.
5100 Anaheim-Telegraph Rd., Los Angeles

ILLINOIS
C. C. Fuller Co.
520 No. Michigan Ave., Chicago, Ill.

OKLAHOMA, ARKANSAS
Diesel Power Company
1801 N.E. 9th St., Oklahoma City, Okla.

LOUISIANA and MISSISSIPPI
Logan Perkins
Int'l. Trade Mart, New Orleans, La.



Like the Motto of General Nathan Bedford Forrest

MAGCOBAR DEALERS

"GIT THERE FUSTEST WITH THE MOSTEST"

Your Magcobar Dealer keeps ample stocks on hand at all times and maintains a fleet of delivery trucks to give you 'round the clock service. Their motto . . . like that of General Nathan Bedford Forrest . . . is to "git there fustest with the mostest."

Many times this fast Magcobar delivery service has prevented blowouts which would have resulted in loss of life, caused serious property damage and a waste of vital natural resources. When you need mud, be sure to call your Magcobar Dealer. There are more than 300 Magcobar Dealers strategically located to give fast service throughout the oil country.

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

- MAGCOBAR
- MAGCOGEL
- HIGH YIELD
- MAGCO-FIBER
- XACT CLAY
- FIBER SEAL
- SALT GEL
- MAGCO-PHOS
- RED OX
- MAGCO-MICA
- TANNATHIN
- JEL-OIL MUD
- JEL-OIL "E"
- "E" CONCENTRATE
- NOHEEVE
- SEAL FLAKES
- MY-LO-JEL PRESERVATIVE
- QUEBRACHO
- CHEMICALS

Write today for your free copy of the booklet, "Magcobar Service . . . in tune with industry needs."

MAGNET COVE BARIUM CORPORATION

ONE OF THE DRESSER INDUSTRIES

MALVERN, ARKANSAS • HOUSTON, TEXAS

These tubes have service "built in"

CHASE ANTIMONIAL ADMIRALTY

(a patented alloy)

Since 1935, millions of pounds of Chase Antimonial Admiralty* tubes have been installed and are serving well. This testifies that they'll give you years of service, too.

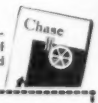
These tubes resist dezincification because they have *enough* antimony. And because antimony doesn't affect grain structure, it will not weaken the tube.

Chase Antimonial Admiralty* stays tough . . . stands up under heavy duty. Send coupon for FREE book on Condenser and Heat Exchanger Tubes.

CHASE WAREHOUSE STOCKS:
NEW YORK, BALTIMORE, NEW ORLEANS, LOS ANGELES, also carried by —
Vinson Supply Co., Tulsa
Standard Brass & Mfg. Co., Houston.

*U.S. Pat. No. 2,061,921

FREE CHASE BOOK discusses corrosion problems and selection of proper alloy for condenser and heat exchanger tubes.



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Waterbury 20, Conn.

Please send me Free Book on Condenser and Heat Exchanger Tubes.

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Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

• *The Nation's Headquarters for Brass & Copper*

Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
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Boston	Detroit	Minneapolis	Providence	(Trades office only)
Chicago	Houston†	Newark	Rochester†	
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CHASE 75th ANNIVERSARY 1876 1951

THE HUB of supply and demand in the oil industry is your near-by Jones & Laughlin Supply store. These stores afford you ONE-STOP supply service at any one of 82 convenient oil country locations in the United States and Canada.

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

Jones & Laughlin Supply Company

"...here's MY warehouse!"

EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A.

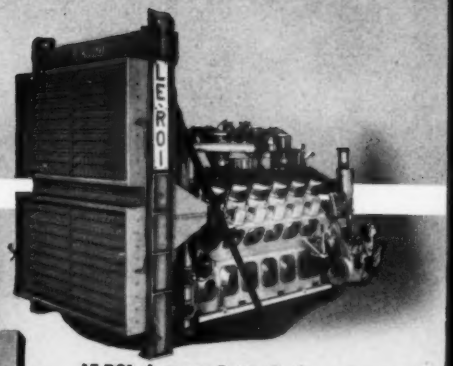
82 STORES • 17 OFFICES • 6 RESIDENT SALESMEN

General Offices: TULSA, OKLAHOMA

J&L STEEL

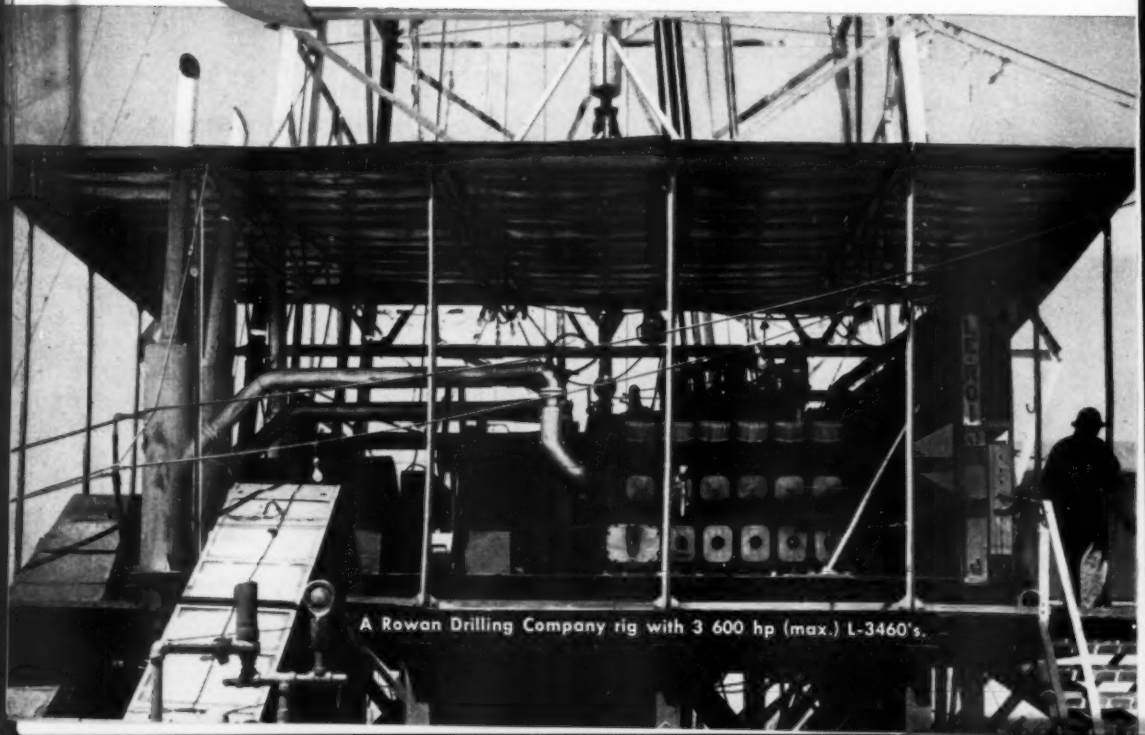
Subsidiary of Jones & Laughlin Steel Corporation

Le Roi 3 way Partnership



1. **LE ROI gives you Better Engines**—for example the L-3460 with its advanced design, V-12 construction and 600 maximum HP — built to meet oil-field demands for more power. Compactness and a weight of only 12,200 pounds give you an extremely low weight-to-horsepower ratio.

600 hp. L3460's put (MAX.)



A Rowan Drilling Company rig with 3 600 hp (max.) L-3460's.

2. **EXCLUSIVE LE ROI DISTRIBUTORS give you Better Applications**—distributors who sell Le Roi engines are oil-field power specialists. They know engines. That's why they can select the right power unit for any application. That's why you can count on Le Roi for dependable, low-cost power.

3. **YOU get Better Service**—yes, you get personal attention from engine experts when you deal with exclusive Le Roi distributors — because they handle Le Roi, and only Le Roi! Large parts-stocks and skilled mechanics mean prompt service and a minimum of down-time. Remember, keeping your Le Roi engines running is the sole responsibility of our distributors.

you way ahead of the field

...with compactness, more power, greater speed range, greater accessibility

Here's the last word in oil-field engine design — Le Roi's V-12 L3460 with its wide speed range from 600 to 1350 rpm and horsepowers from 350 to 600. It produces plenty of low-cost dependable power for a wide variety of applications — drilling, pipeline service, power generation, etc.

Rowan Drilling Company, for example, uses 10 of these engines on four different rigs. The advantages, of course, for drill-rig applications are: fast acceleration, plenty of lugging power at low speeds, and compactness.

The L3460 is also a standout for pipeline service. It has unusual dependability and economy under continuous load, space-saving size for easy installation, and easy accessibility that simplifies maintenance.

It pays to use L3460's. Not only do you get oil-field power at its best but you also enjoy the benefits of Le Roi's 3-way partnership. See your Le Roi distributor and find out why better engines, sound applications, and prompt personal service put you ahead of the field.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio — Oil Field Headquarters: Tulsa, Oklahoma

LE ROI

See these Le Roi Distributors for a Profitable 3-way Partnership

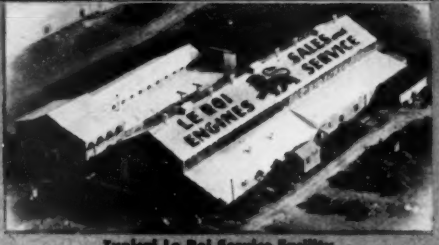
Oklahoma
Le Roi Company Branch—Tulsa
Carson Machine & Supply Co.—Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Hertex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.



Typical Le Roi Service Facility

Here's Le Roi's exclusive distributor in Oklahoma—Carson Machine and Supply Company. Centrally located and staffed with plenty of experienced manpower, Carson can give skilled service to any customer in the state within a few hours. Shop facilities are modern and include a dynamometer for testing engines. Complete parts stocks are maintained for all Le Roi engines.

Michigan
Hoist Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lacey Export Ltd. — Calgary, Edmonton, Alberta.

Tube Swelling Can't Happen Here

NO TUBE SWELLING... NO PRESSURE LOSS... WITH THIS SPECIAL STAINLESS STEEL INNER WIRE BRAID

Here's the special stainless steel inner wire braid that puts CONCORD #20 Steam Hose in a class by itself. The constant inside diameter assures full steam pressure at all times.

Concord #20 STEAM HOSE

- **LONGER LIFE** — No tube swelling to shorten the life or reduce dependability of Patented CONCORD #20 Steam Hose.
- **FULL PRESSURE FLOW** for full life of this Hose because it is constructed with a special stainless steel inner wire braid.
- **RECOUPLE EASILY, QUICKLY** with no complications. Positive static dissipation.
- **BALANCED CONSTRUCTION** — Alternate high tensile steel wire and rubber layers over outside of tube for burst protection — Asbestos braid provides positive cover adhesion and insulator for the tough, abrasion resistant cover.

CONCORD #20 — Flexible, Tough, Dependable—is the Steam Hose you will want to have working for you!

BWH

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

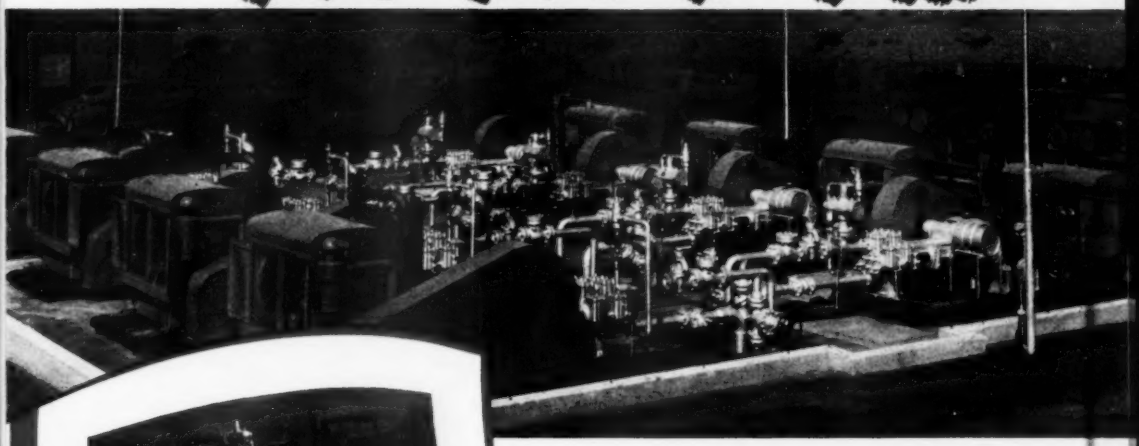
The HAPPY COMPANY
Formerly HAPPY BELTING COMPANY
TULSA, OKLAHOMA

BRANCH STORES:
Seminole, Oklahoma
Odessa, Texas
Salem, Illinois
Ellinwood, Kansas

DISTRICT REPRESENTATIVES:
Kilgore, Texas
Wichita Falls, Texas
Wichita, Kansas
Pampa, Texas

BWH Industrial Hose • Sure-Grip Sheaves • Happy Coolers
P & H Engine Starters • Rubber Belting • Safety Switches
Leather Belting • Happy Pumping Units • Bull Dog V-Belts
Power Transmission Equipment

We help to feed RICHFIELD's $7,000,000 "Baby"



BIG pipe lines like Richfield's, once laid, become fixed and permanent installations. It is the feeder lines that provide flexibility and expansibility, and that's where Gaso Pumps come into the picture.

They help to feed main lines by powering the auxiliary lines that reach out into tank farms, field storage and other source-points of oil.

Used singly or in batteries, Gaso Pumps are adaptable to any requirements. Their portability permits transfer when necessary to meet changed conditions. And their performance record assures the kind of service realistic pipe line engineers look for.

GASO PUMP & BURNER MFG. CO.

902 EAST FIRST ST., TULSA, OKLA.

EXPORT OFFICE: 149 BROADWAY, NEW YORK

Shreveport: W. L. Somner Co., 419 Lake Street

Los Angeles: 2529 Chambers St., Vernon

Western Canada: Lufkin Machine Co. Ltd., Edmonton, Alberta

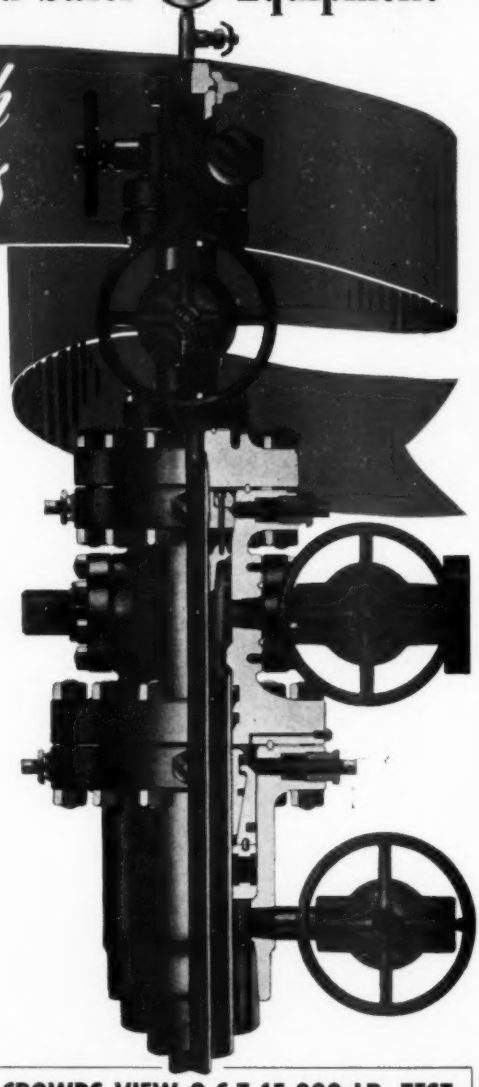
GASO PUMPS

for every oil industry need

SINCE 1927

When the Oil Industry Needed Safer Equipment

O-C-T pioneered high pressure controls



During the years O-C-T has served the oil industry, we have felt a responsibility to be ready with equipment to meet **future needs** as well as dependable equipment to meet the every-day needs at hand.

As a result of this program of continuous research and development, Oil Center Tool Company gave the industry its first 10,000 lb. tree . . . **and** its first 15,000 lb. test tree.

With the expanded search for new and deeper oil reservoirs, pressures and depths will be encountered which will place other new demands on equipment. In anticipation of these future needs, O-C-T has again stepped up its program of research and development. So, when stronger, higher pressure controls are needed, O-C-T will have the equipment required for your operations.

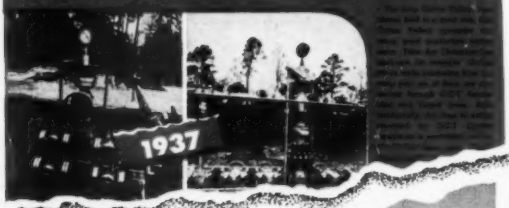
On your next well . . . on wells of any depth or pressure . . . take advantage of the added strength, safety, convenience and flexibility provided by dependable O-C-T products. They have been engineered and manufactured to help you drill for and produce oil with economy and greater safety. Ask your O-C-T Representative or write for details.

OIL CENTER TOOL CO.

P. O. BOX 3091 • HOUSTON, TEXAS

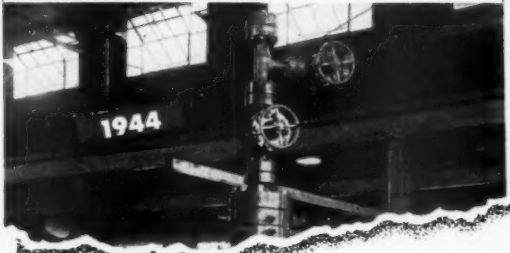
Canada — Canadian-Vickers, Montreal Canada.
Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Southall Middlesex, England.
Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

When the industry demanded 10,000* TEST PRESSURE EQUIPMENT, O-C-T *was first to provide it — at Cotton Valley, for example*



O-C-T PRODUCTS HAVE PROVED DEPENDABLE ON THE WORLD'S DEEPEST WELL—ON THE WORLD'S HIGHEST PRESSURE WELL

CROWDS VIEW O-C-T 15,000 LB. TEST CHRISTMAS TREE—WORLD'S FIRST!



ANOTHER IN STANDARD OIL'S SERIES OF INSTITUTIONAL ADVERTISEMENTS APPEARING IN 150 NEWSPAPERS AND A SELECTED LIST OF FARM PAPERS THROUGHOUT THE MIDDLE WEST.

NEW SOURCES OF OIL must continually be found in order to increase America's petroleum reserves even over their present peak, the highest in history, to insure petroleum for the nation's growing defense requirements. Industry's goal calls for a repetition in 1951 of the all-time high of 43,400 wells drilled last year. Yet the costs of finding and proving new fields and drilling in old fields continue to rise. In ten years from 1940 to 1950 Standard Oil's average cost of drilling a well, including "wildcats" and wells in proved fields, has more than doubled.

DRILLING A WELL CAN PUT YOU IN THE HOLE

Who hasn't dreamed of striking oil? Drilling an oil well can be an exciting way to success—or it can put you in the hole.

The cost of finding oil in the ground is now several times greater, per barrel found, than it was ten years ago. A "wildcat" drilling operation can represent an outlay of fifty to a hundred thousand dollars, sometimes runs over a million dollars. And you run a big risk; on an average, seven out of ten "wildcats" result only in a dry hole in the ground.

Finding oil is only the beginning. Standard Oil's subsidiary companies drill hundreds of wells in proved fields, pump oil from the fields through thousands of miles of pipelines to refineries where it is made into vast quantities of products. Our modern research laboratories continually test and improve the more than 2,000 products we make. Finally, we distribute these quality products to locations where it is convenient for you to buy.

Right from the well up, it's a big job to provide the petroleum products on which the nation's industry and security depend. It takes many sound, profitable companies—large and small—to do it, for only a company that makes a profit can invest in the constantly improved facilities necessary to meet constantly increased demand.

Because Standard Oil is a big company, *because* Standard Oil makes a profit, we can do our share of the big job. To do it successfully is our obligation to America and to three large groups of Americans: our millions of customers, our 46,700 employees, and our 116,000 owners.

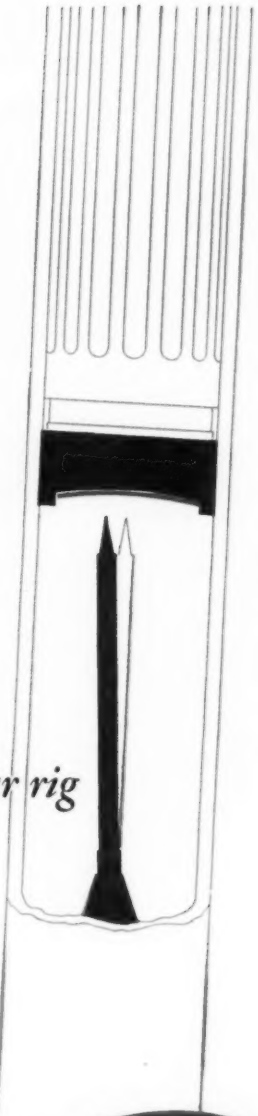
Standard Oil Company (INDIANA)

PART OF THE BIG JOB of bringing you high quality gasoline and oil products is done by Martin Pekarik of our Wood River, Illinois refinery. He's one of the 46,700 employees of Standard Oil and its subsidiary companies. Last year each of these employees was backed by an average investment of $31,400 in tools and equipment which helped him produce more, earn more and have steady work.

PART OF THE BIG JOB is made possible by the investment of our stockholders. One of our 116,000 owners is Mrs. Margaret Sitton Jackson of Sedalia, Missouri, who has worked for the same company for 37 years and has owned Standard Oil stock for more than 25 years. As a return to our stockholders on their investment, we pay dividends and have paid dividends for 58 consecutive years.

PART OF THE BIG JOB is paid for out of profits from sales to customers like J. C. Clark of Peoria, Illinois. Because millions of people like our products and buy them, we have grown big. Because we are big, we are able to serve you better with constantly improved products at reasonable prices. The price of gasoline, for instance, today is about the same as in 1925, without taxes. Yet its performance is much better.

ACCURACY



—another reason for Totco on your rig

In controlled vertical drilling, your success depends on the accuracy of your drift indicator. And you can count on TOTCO —it's accurate!

Just look at TOTCO's chart head . . . you'll notice that the recess in this head is concave . . . that the accurately graduated composition chart sits firmly on this curved bottom, forming itself into a perfect arc absolutely concentric to the arc in which the angle indicator moves. This exclusive TOTCO design, small as it may seem, eliminates errors produced by a chart fixed in a flat position and insures absolutely accurate recordings.

All over the world, operators prefer TOTCO design and construction for sustained and absolute accuracy.

Be **SURE** *you know, use* **TOTCO**

Technical Oil Tool Corp., Ltd.

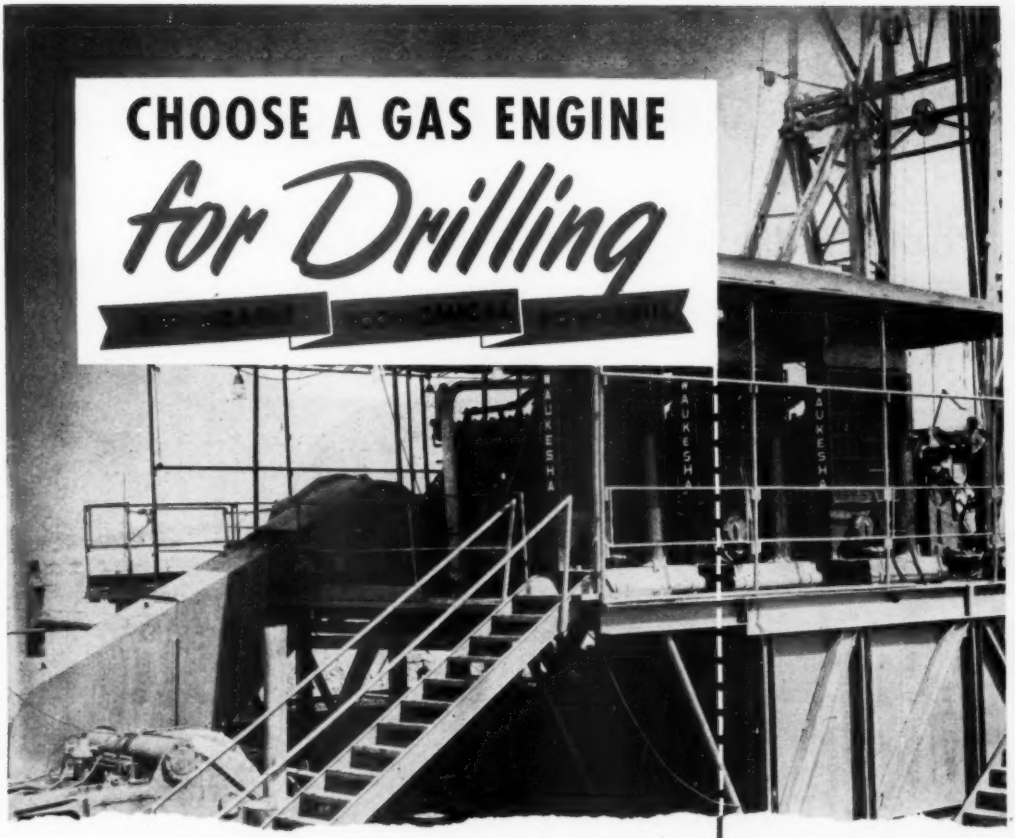
1057 N. La Brea Ave., Los Angeles 38, Calif.

Exclusive Distributors:

California—The Republic Supply Company of California
Domestic—The Continental Supply Company
Canada—Oil Well Supply Company
Export—Lucey Export Corporation, New York City

TOTCO Recorder

CHOOSE A GAS ENGINE *for Drilling*



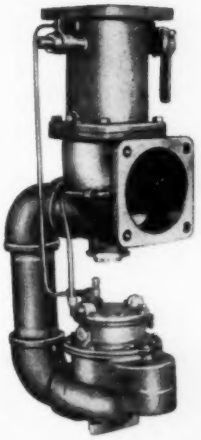
Waukesha Gas Engines Use Ensign Carburetion

● If you'll take a good look under the canopy of this drilling rig, you'll see three Waukesha 6-LROU Gas Engines coupled together to the tune of about 1200 h.p.—the sweetest music you've ever heard. You can't beat gas engine power for over-all economy and dependability of operation. These gas-powered Waukesha work horses, available in all sizes, not only drill the hole faster and cheaper, but also lift oil to the surface once the well goes on the pump.

With Natural Gas or Butane-Propane, your engine maintenance costs are lower—no dilution of lubricating oil, no hard carbon, no smoke. No specially trained personnel required to operate and service the engines.

Gas engines (Natural Gas or Butane-Propane) equipped with Ensign Carburetors offer the driller or production man the best type of field power ever devised. Ensign engineers are always at your service.

Ensign Model A Gas Carburetor and Model B Fuel Regulator.



ENSIGN CARBURETOR COMPANY

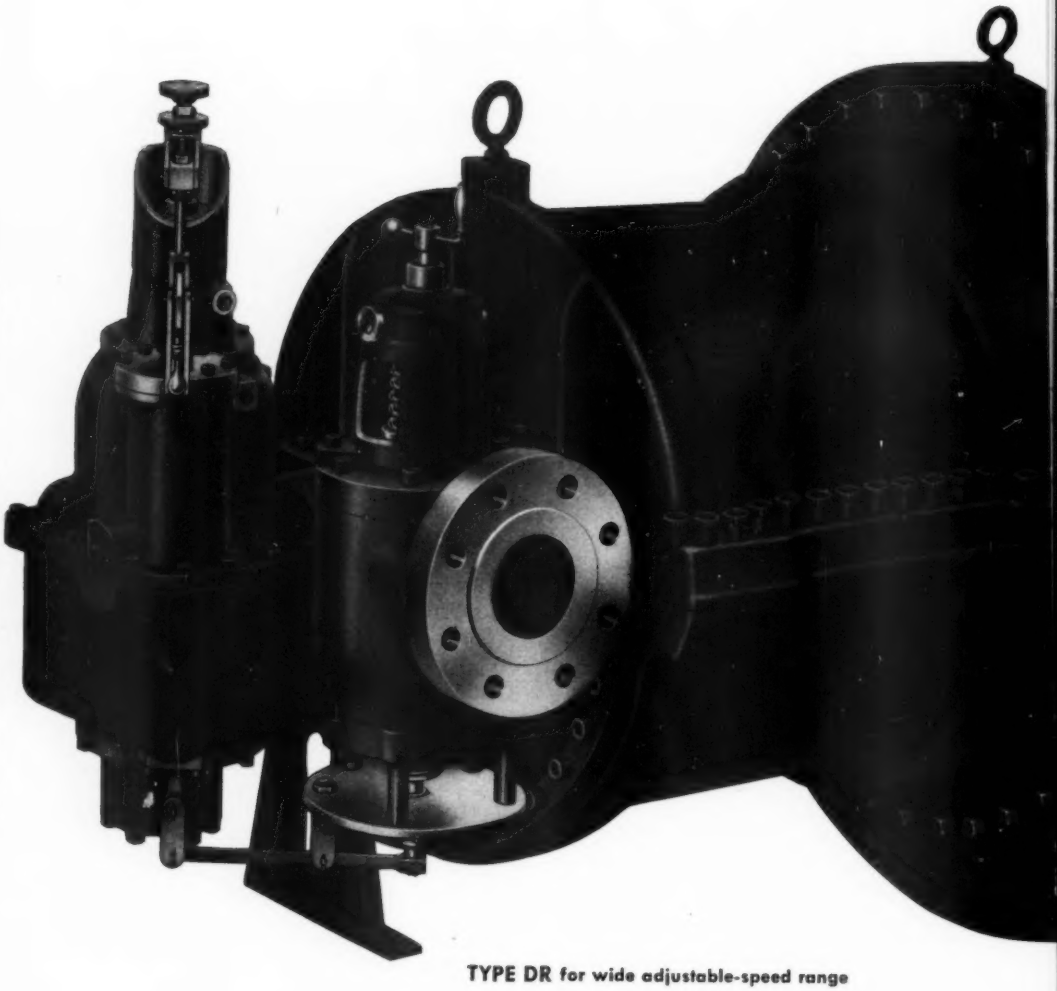
7010 South Alameda Street
Huntington Park, California

2330 West 58th Street
Chicago 36, Illinois

DEALERS AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

**This advertisement is one of a series featuring popular makes of gas engines in field service.*

GENERAL ELECTRIC ANNOUNCES *New*



TYPE DR for wide adjustable-speed range

Multi-Stage Turbines

Available in Four Designs—200 to 5000 hp

Now in production! General Electric's completely new, multi-stage turbine drives . . . designed to give you maximum mechanical power for every fuel dollar . . . available to meet any mechanical drive application where efficiency and reliability are "musts."

FOUR NEW TYPES—The DP, DR, DRV, DRVX—incorporate the newest ideas in improved turbine design. Four different governing systems give you a wide selection of performance ratings for either condensing, noncondensing or automatic extraction applications.

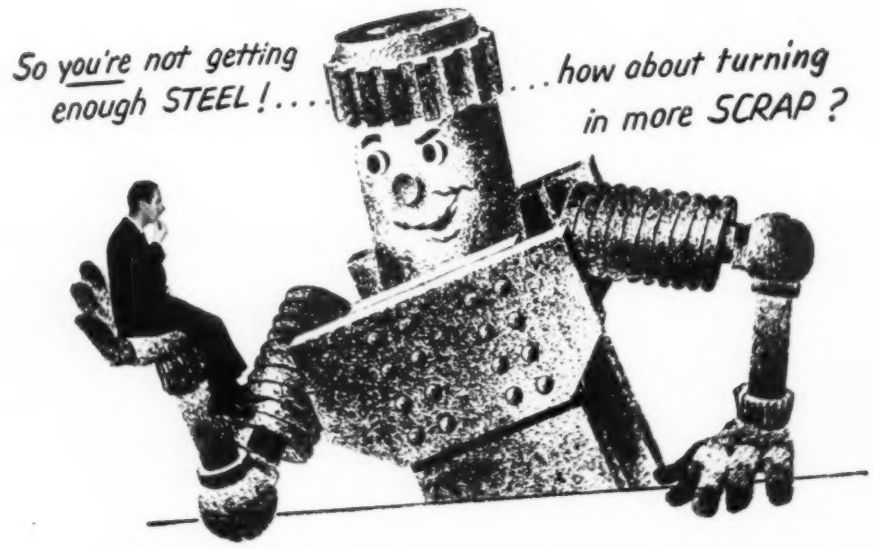
NEW FEATURES that spell increased economy and reliability are built into General Electric's new multi-stage turbines. A completely new sectional valve gear, for instance, gives you greater efficiency for part load operation. Refinements in governing, lubrication and steam chest design make these the finest mechanical-drive turbines General Electric has ever produced.

A NEW TECHNIQUE of manufacturing from standard, interchangeable patterns promises you savings in initial investment and shortened delivery time. You get a custom turbine, designed for your job, built from standard parts.

Get the full particulars on these brand new multi-stage turbine drives. Write for your copy of our new bulletin, GEA-5580, "G-E Multi-Stage Turbine Drives." Section 252-52, General Electric, Schenectady 5, N.Y.

252-52

GENERAL ELECTRIC



There's only one quick way to get more steel!

...get more SCRAP to the mills, at once

LET'S be realistic about the scrap shortage. The need for scrap is desperate. It threatens to hamper our whole National Defense effort—and it vitally concerns *you* because it boils down to this:

Unless 100,000 tons of industrial scrap roll into the steel mills every day, steel production will drop, and there'll be *less* steel for everyone—you included.

On the other hand, if more scrap is turned in, more steel will be turned out—and the more steel that's made the more steel *you'll* get.

So—if you want more steel—do your full share in getting your scrap back to the mills. Comb through your plant, again and again. Tap every source of dormant scrap. Dig out every retired machine that you can possibly spare and rush it to your scrap dealer. Rip out any old rails and switches that are rusting away on unused sidings—and scrap them. Scrap your antiquated dies, jigs and fixtures, your worn-out tanks and boilers that are gathering dust in some forgotten corner. Make sure that not a single pound of scrap is by-passed. Sell it—ship it. It means good money for you, more scrap for the Nation's scrap pile, and more steel for *everyone*.

• • •

Remember—the Nation's productive effort depends primarily on steel—and steel depends on SCRAP . . . *your* scrap. Turn it in—NOW.

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

This page would ordinarily be used to tell you about

NATIONAL SEAMLESS
Drill Pipe, Casing and Tubing

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

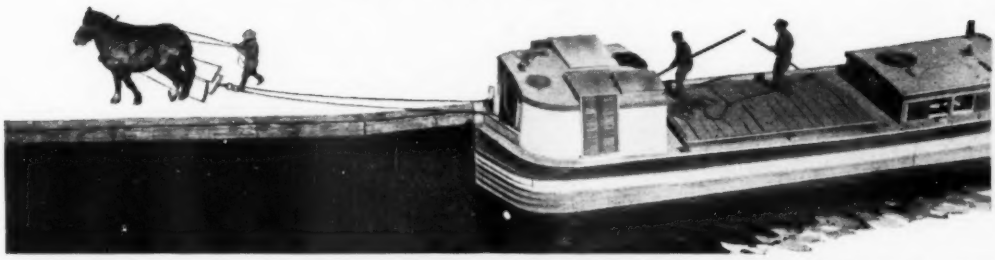
NATIONAL TUBE COMPANY, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

1-1902

UNITED STATES STEEL

Now Petroleum Tows the line!



Petroleum Progress helps keep marine traffic moving

Towboats are mostly power plants and propellers. Petroleum provides the essential fuels and lubricants. Many of these are Texaco—which serves shipping the world over.

TODAY'S marine workhorses are the rugged, little tugs or towboats. These dwarfed, waterborne giants push and pull scows, barges, cargo ships and elegant ocean liners—with infinite ease and tremendous skill—through America's maze of inland waterways, in and out crowded harbors and even on the high seas.

Here is another notable example of petroleum supplying the power that helps keep America on the move—and strong. It also illustrates the progress made possible by free men at work in a land of free competition.

THE TEXAS COMPANY

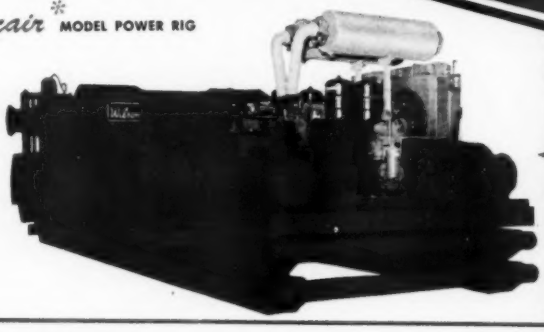
Petroleum Promotes Progress

TEXACO

Shallow or Deep... it's

Giant Single Engine Torcair* MODEL POWER RIG

RATED CAPACITY — 5,000 Ft., Using 4½" Drill Pipe
or 6,000 Ft., Using 3½" Drill Pipe

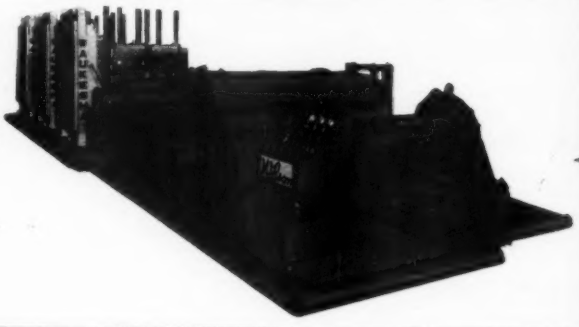


5,000' to 6,000'

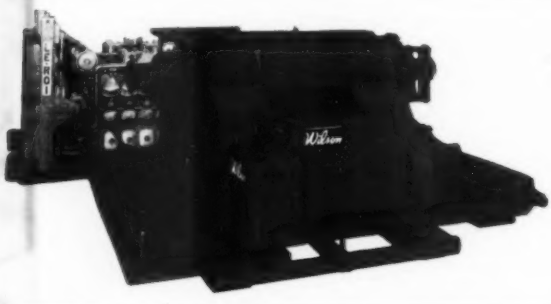
Giant Torcair*-Roadair

MODEL POWER RIG

RATED CAPACITY —
8,000 Ft., Using 4½" Drill Pipe
9,500 Ft., Using 3½" Drill Pipe



8,000' to 9,500'



Titan Torcair*-Roadair

MODEL POWER RIG

RATED CAPACITY —
12,500 Ft., Using 4½" Drill Pipe
15,000 Ft., Using 3½" Drill Pipe

12,500' to 15,000'

Super Titan "66"

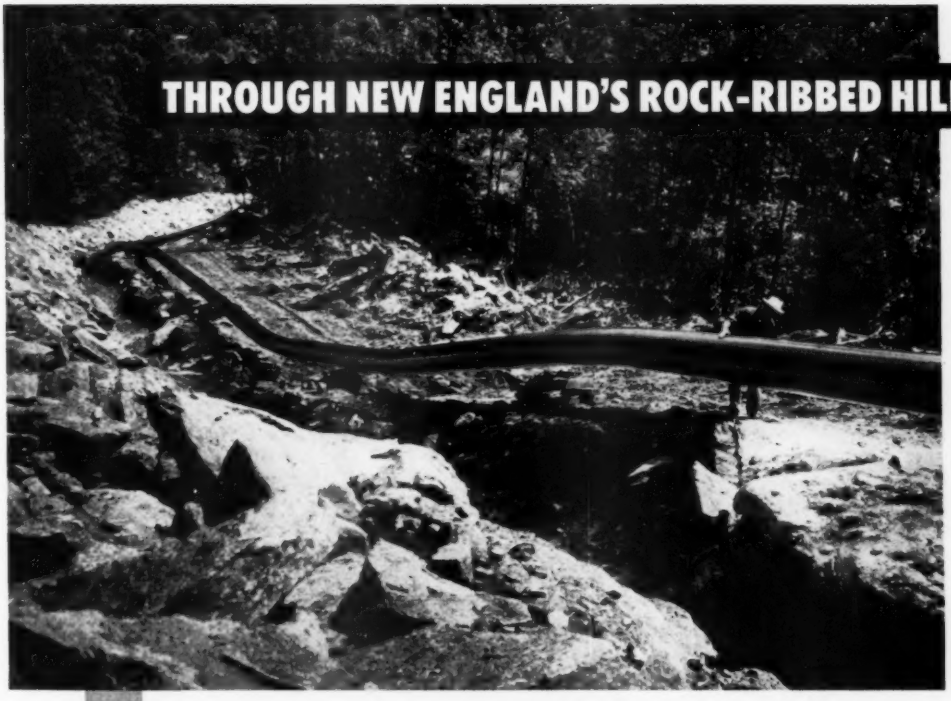
TORCAIR-ROADAIR MODEL POWER RIG

RATED CAPACITY —
22,000 Ft., Using 4½" Drill Pipe
25,000 Ft., Using 3½" Drill Pipe

22,000' to 25,000'

* *Trade Mark Registered*

Wilson MANUFACTURING CO., Inc.
WICHITA FALLS, TEXAS



with C. F. & I. WELDED STEEL PIPE

It's C. F. & I. Welded Steel Pipe on the 254-mile high pressure gas transmission pipeline from Lambertsville, N. J. to Boston, Mass., now being pushed through New England's rocky hills.

Contributing in no small measure to its early and successful completion are the special characteristics of C. F. & I. Welded Steel Pipe. Made from quality-controlled, high-tensile steel plates, C. F. & I. steel pipe bends easily ... field-welds faster and more uniformly. Hydraulically expanded to accurate size for perfect roundness with precision beveled ends, it can be fitted up and lowered-in with greater speed and ease of handling.

Plates from which C. F. & I. steel pipe is made are produced entirely in our own plant, starting with our own open hearth furnaces — your assurance of consistently high quality.

C. F. & I. steel pipe is available in lengths of 40 feet and in overall diameters from 24 inches through 36 inches. Write for complete information to Claymont Steel Corporation, Claymont, Delaware.

Flanged and Dished Heads . . . Carbon and Stainless-Clad Steel Plates

CF&I

WELDED STEEL PIPE

PRODUCT OF

CLAYMONT STEEL CORPORATION

SUBSIDIARY OF THE COLORADO FUEL AND IRON CORPORATION

Homestead-Reiser
Self-Seald
LUBRICATED PLUG VALVES

The *Full-Port-Area* Valve built to outlast all other lubricated plug valves in the 200 pound working pressure class.

- 100% PORT AREA
- 100% LUBRICANT SEAL AROUND PORTS
- SELF-SEALING
- AUTOMATIC ADJUSTMENT FOR WEAR
- EXTREME ECONOMY OF LUBRICANT

Remains drop-tight for
Up to 22 TIMES
more operations
without Re-lubrication

Write today for Reference Book 39-Section 3.

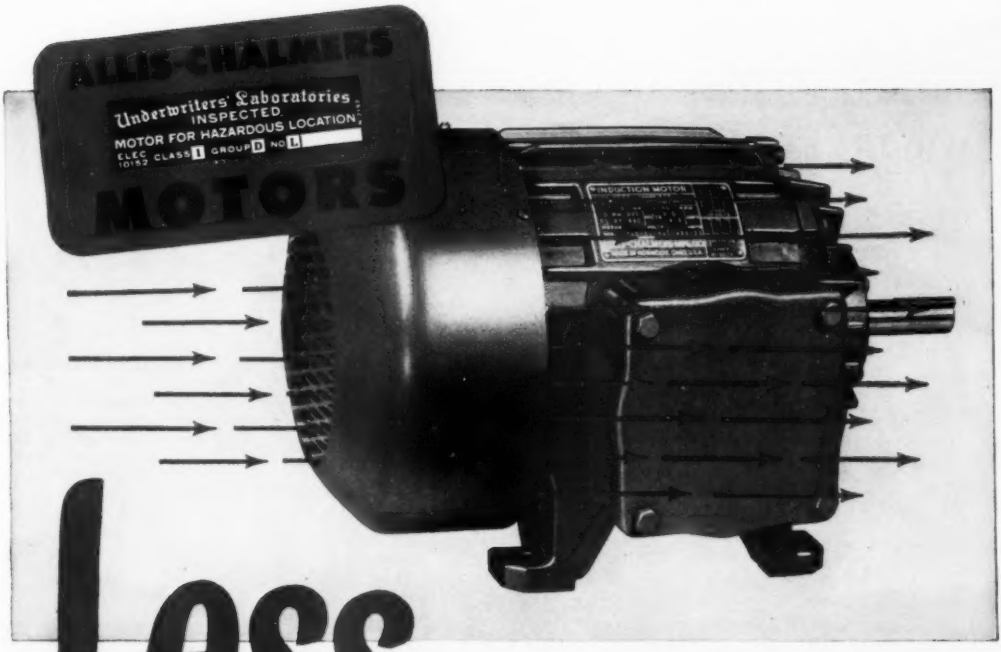
Self-seald MEANS

. . . that in addition to a full-port lubricant seal, the wedge action of the plug under line pressure, forces the surfaces of the plug outward, and constantly presses against the seating surfaces of the body, keeping them always in intimate contact. The plug automatically adjusts itself for wear, assuring extra long life, maximum leakless service, and lubricant economy.

HOMESTEAD VALVE MANUFACTURING COMPANY

Serving since 1892

P. O. BOX 403 CORAOPOLIS, PA.



Less MOTOR CLEANING ...INSPECTION...OVERHAUL!

HERE'S A MOTOR that actually blows itself clean! Dirt is carried away by cooling air blown over the ribbed cast iron frame and bearing housings of this new Allis-Chalmers explosion-proof motor.

Dirt can't build up to cause overheating. Concealed air passages and pockets have been eliminated. Even oily dirt that sticks can simply be wiped or blown off.

And this means savings! Lower maintenance costs than ever before on the new Allis-Chalmers Type APZZ explosion proof motor.

Rigid Construction

The frame is cast iron which has high resistance against corrosion and distortion. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZZ explosion proof motor is built in all NEMA standard frame sizes from 224* to 505. Also in totally-enclosed, fan-cooled type. Your A-C Distributor or Sales Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7286.

A-3473

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

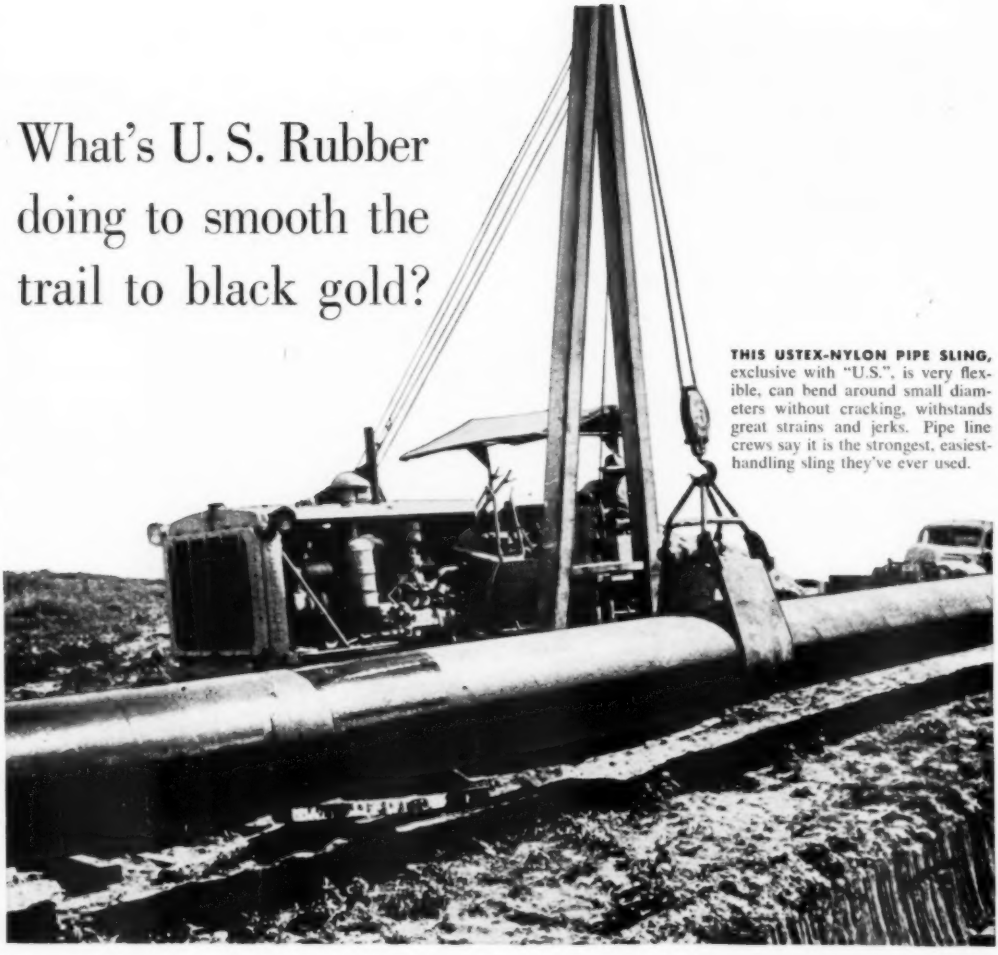
PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APKK also available in frames 203 to 224 inclusive.

What's U. S. Rubber doing to smooth the trail to black gold?



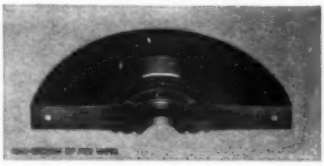
THIS USTEX-NYLON PIPE SLING, exclusive with "U.S.", is very flexible, can bend around small diameters without cracking, withstands great strains and jerks. Pipe line crews say it is the strongest, easiest-handling sling they've ever used.

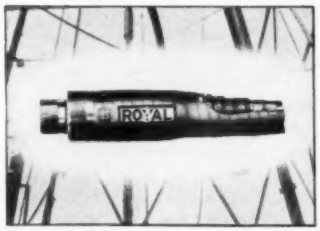
Shutdowns become more frequent and more serious, if reliable equipment, designed to handle these *new* problems, is not available. "U. S." experts are always ready with products that fill the new specifications required by today's progressive oil men.

You can cut costs, avoid delays by specifying U. S. Rubber Products for the oil field. "U. S." oil specialists and engineers are always ready to help you on specialized problems. Write to address below:

PRODUCTS OF
U.S.RUBBER
SERVING THROUGH SCIENCE

THIS NEW PIPE WIPER is reversible, molded in one piece with double wiping lips. Does the work of two old-style wipers, yet costs no more than the single type. Easily cut to pipe size. Individual wipers have handled over 315,000 feet (nearly 60 miles) of piping.

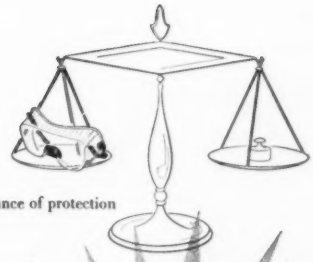




RUGGED U.S. ROYAL 4 ROTARY HOSE is so powerful that it need not be replaced by steel hose when high pump pressures are required. No excessive straining or kinking, because it is built for mousehole connections.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.



One ounce of protection

AO's NEW INEXPENSIVE ALL PLASTIC GOGGLE

AO One Piece ALL PLASTIC GOGGLE

- LIGHTWEIGHT
- NON-FOGGING
- WELL-VENTILATED
- NON-FLAMMABLE
- WELL-FITTING

Note the many perforations which assure ample ventilation and minimize fogging.

Face contacting edges are rolled for greater comfort on this goggle which offers a wide range of vision.

Goggle fits comfortably over most personal glasses with nosepiece hugging nose snugly.

Made of impact resisting plastic, this one-piece goggle (AO479 Clear, AO480 Green) is "optically correct" and meets government specifications. It affords exceptional wide angle vision and can be worn over most standard types of personal glasses and most prescription spectacles and goggles. Recommended for protection against foreign particles striking from any direction on the following types of work: babbiting, chipping, cutting rivets, grinding, hand-tool operations, machine operations, spike driving and similar operations. Your nearest AO Safety Products Representative can supply you.

QUICK FACTS
479-480 GOGGLE

One size only but designed to fit all faces comfortably

Elastic headband, easily adjusted

4 point contact to face of wearer, resists rocking

Plastic nosepiece fits all noses comfortably and snugly

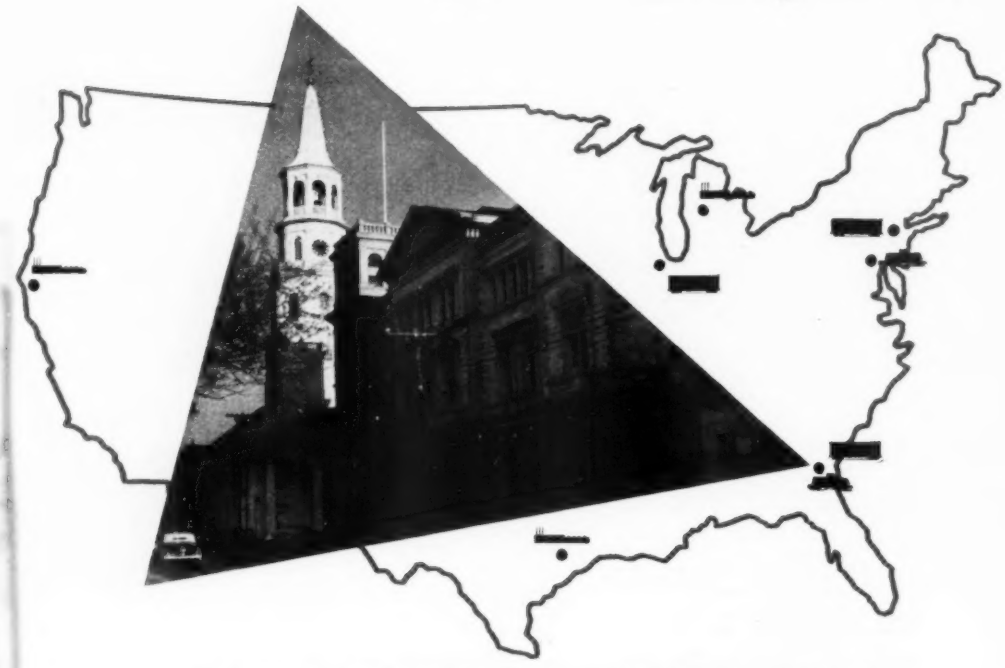
Rolled edges for comfort, better fit in contacting face

Order by number 479 Clear
Order by number 480 Green

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

how close are you to *Charleston South Carolina?*



Charleston is a main distribution center for Dow Caustic Soda!

For dependable caustic soda delivery . . . look to Dow for superior service! Dow distributes Caustic Soda Solution from bulk tank terminals in Charleston, South Carolina and Carteret, New Jersey. Caustic Soda Solid, Flake and Ground Flake are shipped from terminals in Charleston, South Carolina, Chicago, Illinois, and Port Newark, New Jersey. By ship, rail and barge Dow Caustic Soda production is shipped into these terminals from three large plants—in Michigan, Texas and California. For constant supply of your caustic needs . . . use Dow's convenient distribution facilities today!

wherever you are . . . *you're close to*

DOW CAUSTIC SODA

THE DOW CHEMICAL COMPANY · MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Atlanta • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto 1, Canada

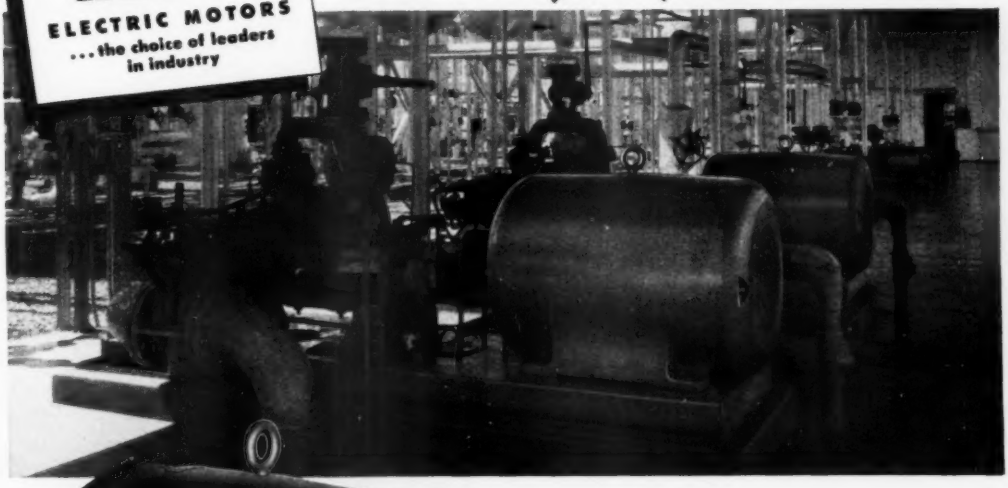
DOW

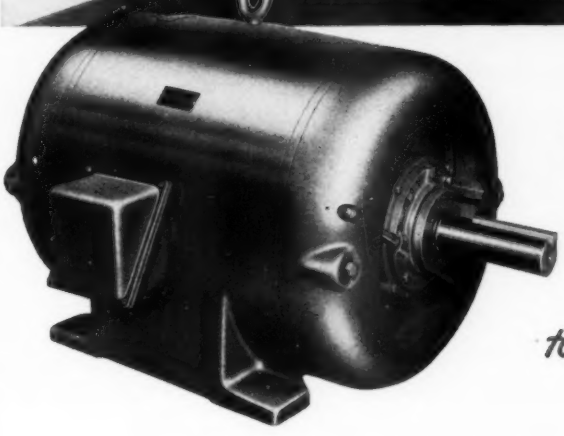
CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

Built for your protection...





Wagner

Cast-Iron Frame MOTORS

totally enclosed...fan cooled ...corrosion-resistant

These totally-enclosed fan-cooled motors are built to take it—destructive elements, dirt or dust, acids or fumes don't interfere with their dependable operation.

Wagner cast-iron motors are especially suitable for installation in steel mills, mines, chemical plants, refineries and for other applications where corrosion is a problem, because practically all exposed parts are made of heavy, corrosion-resistant cast iron.

Where protection against explosive atmospheres is required, an explosion-proof design (type JP) can be furnished. Both the standard totally-enclosed type and the explosion-proof type are available in ratings from 2 to 250 horsepower, with either normal torque or high torque characteristics.

Wagner's new Bulletin MU-132 gives complete information on these fully-protected motors. Write for your copy today. Thirty-one branch offices, located in principal cities, are ready to assist you in any motor application problem.

® Wagner Electric Corporation 1891 WE 1951

MEI-19

WAGNER ELECTRIC CORPORATION
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

STRONG RIG...weak Link

BJ FIXES—

quick as a WINK!

With BJ factory rebuilding you're assured of the correct welding and heat treating techniques—of magnaflux inspection before and after repair—and of the "experience and knowledge of the men who made 'em."

Here's how your field-worn tools are rebuilt the BJ way.

Complete factory overhaul includes—

- Magnaflux inspection to detect hidden cracks.
- The use of carefully selected welding rods to restore the strength and toughness of BJ links in order that they can again withstand the shock loads of deep drilling operations.
- Controlled reheat treatment to restore steel to its original strength.
- And final magnaflux inspection to give you further assurance of the care and supervision that goes into BJ factory rebuilding.

Find out more about BJ's oil tool rebuilding service from your jobber or BJ representative today!

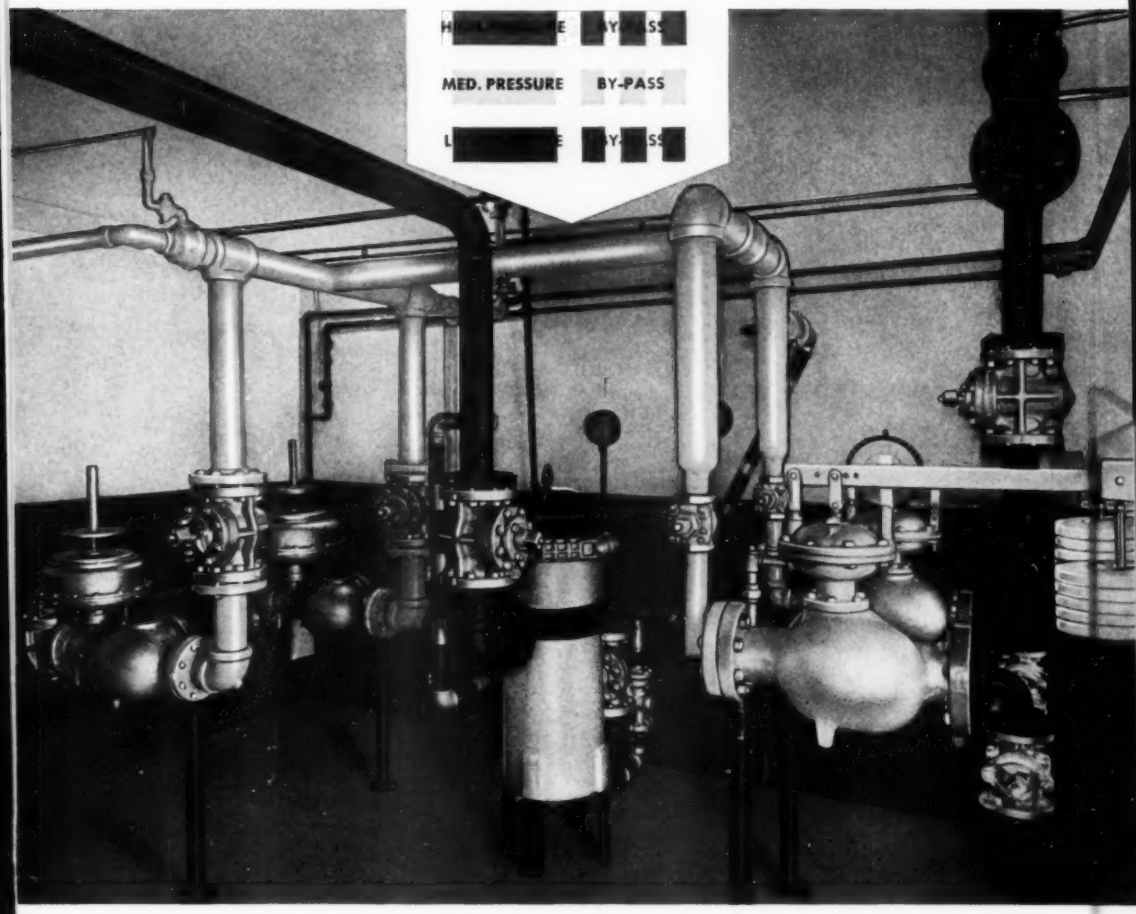
BJ
FACTORY SERVICE
Engineered
OIL TOOL REBUILDING
for safety and long life

Byron Jackson Co.

PACIFIC COAST SERVICE

The men and machines that made 'em know 'em best!

THIS COLOR-CODE IDENTIFIES PIPE PRESSURES....



...AND Rockwell IDENTIFIES TOP NOTCH REGULATOR PERFORMANCE

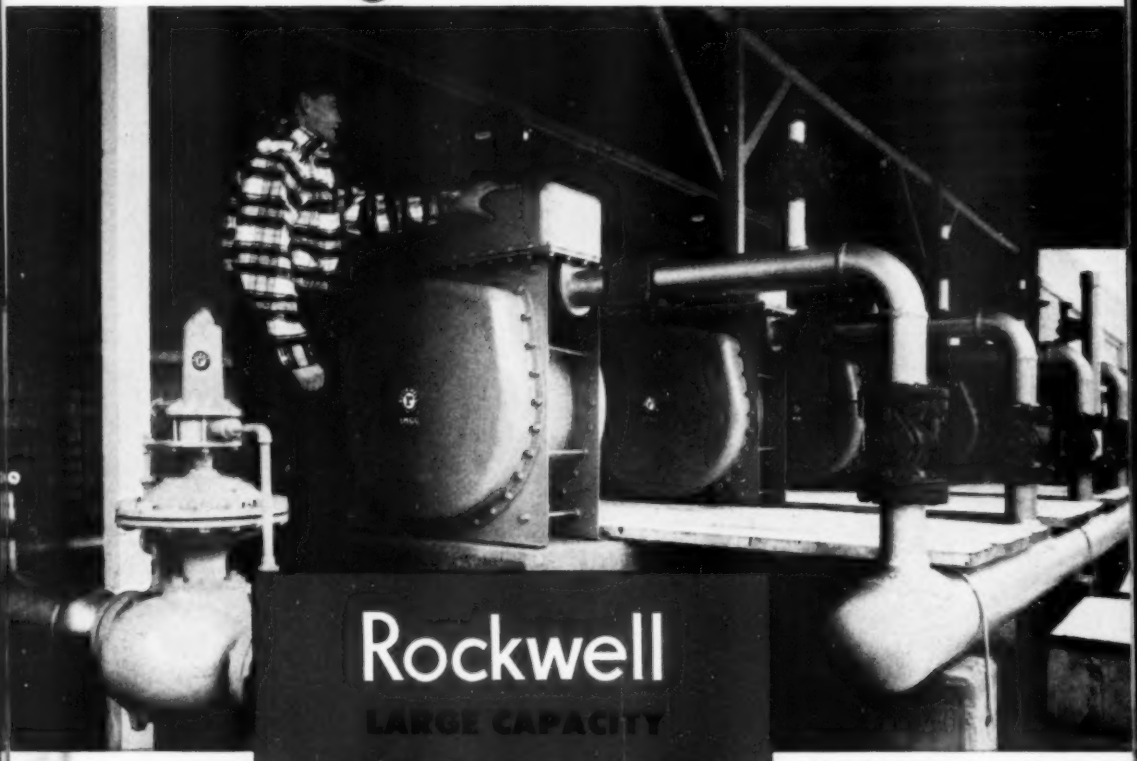
A midwestern utility has adopted this color code for pipes as a means of quickly identifying gas pressures in and around meter and regulator stations. This system makes it possible for even inexperienced employees to properly operate station valves...an excellent safeguard in case of emergency.

Another excellent way to maintain precise, day-in and day-out service is to use Rockwell Balanced Valve Regulators. In addition to providing exceptionally good control over primary and secondary reductions, Rockwell regulators rarely, if ever, need be lifted for service. That's because all parts subject to wear or abrasion can be quickly and economically replaced *with the regulator in the line*. For example, the valve chamber (inlet bowl assembly) can be easily removed through a hand hole area in the body. A new or rebuilt chamber having either hard or soft seats readily bolts in it's place. If desired, the capacity of the regulator can be changed by substituting a different size valve chamber on the same bolt circle in the regulator body. Want more facts about the service economies of Rockwell regulators? Then write for bulletins 1006 and 1055.

Rockwell high and low pressure regulators with Nordstrom valves in color-coded regulating station.

Indoors or out, you'll get superior performance from Rockwell high pressure, pilot loaded regulators.

A BANK OF Big Babies YOU CAN BANK ON



Battery of Rockwell No. 5 meters with Emcorectors measuring gas service to power plant.

WHEN you need the accuracy of positive displacement measurement for large volume loads you can bank on Rockwell pressed steel meters to return every cent of revenue due you. You will appreciate their economy, too, for these meters have compiled unexcelled service records for durability and precision under the most severe turn-on and turn-off conditions. Pressed steel construction gives these giants among meters high impact strength, yet they are comparatively light in weight. Their narrow width conserves space in tight quarters. Yes, performance-wise and value-wise they are your best big meter buy. Ask for bulletin No. 1035.

Rockwell
MANUFACTURING COMPANY
400 No. Lexington Avenue, Pittsburgh 8, Pa.
Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa. International Division, Rockwell Manufacturing Company, 7701 Empire State Building, New York 1, N. Y.

Your best big meter buy—all ways

Meters

TIN

ALUMINUM

CAST IRON

PRESSED STEEL

Regulators

APPLIANCE

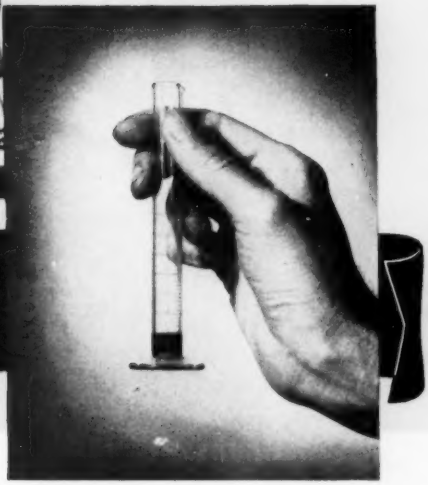
SERVICE

"1001"

BALANCED VALVE

There's a **ROCKWELL METER & REGULATOR** for every use

When IMPERMEX goes in---



FILTER LOSS goes down

(in either fresh or salt-water mud)

With Impermex, operators can make stable drilling mud with filter losses below 1 cc. API, even in the presence of such contaminants as salt, gypsum, anhydrite, and cement. Impermex makes good low-water-loss muds for drilling massive salt or when the make-up water is salty. Impermex muds retain their low-filter-loss properties when drilling gypsum or anhydrite. High pH-lime Impermex muds are not adversely affected even by large amounts of cement. With the use of medium or low pH Impermex muds, the adverse effect of cement may be overcome with conventional chemicals.

Since low filter loss reduces the hydration of many shales, Impermex muds minimize hole trouble with many potentially unstable formations. Cores taken with minimum filter-loss Impermex muds show little evidence of flushing with filtrate. The productive index of wells completed with such muds often shows great improvement over similar wells drilling with conventional muds. And, since these Impermex muds deposit thin flexible filter cakes, there is no interference with or obstruction to tools going in or coming out of the hole. There are many uses for Impermex—inquire about them from your Baroid Service engineer. He can tell you more about how Impermex can help you!

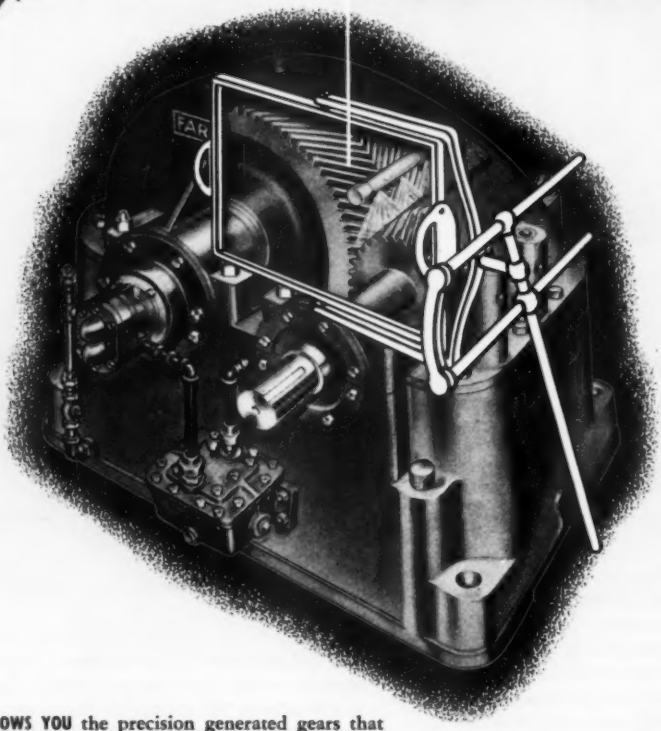
Baroid

BAROID SALES DIVISION
NATIONAL LEAD COMPANY
HOUSTON 1 · TULSA 3 · LOS ANGELES 12

COMPLETE DRILLING MUD SERVICE

This X-ray View Shows You—

WHY NO FARREL® SPEED INCREASER HAS EVER FAILED IN PIPELINE PUMPING SERVICE



IT SHOWS YOU the precision generated gears that operate quietly and efficiently through long years of service . . . the completely self-contained circulating oil system that virtually puts power on velvet . . . the extra large precision-ground shafts . . . the oversize, accurately finished bearings . . . and the exceptionally rigid housing.

IT DOES NOT SHOW YOU the knowledge which has been accumulated by Farrel engineers in the making of thousands of gear units for oil field, industrial and marine service . . . the data obtained from customer service reports . . . or the extensive tests conducted by the company's research department—all of which have contributed to the reputation these units have for providing long, *trouble-free performance with minimum maintenance.*

BUT WHY NOT TAKE A MORE THOROUGH LOOK . . . first, at our bulletin 448-A, which describes these speed increasers in detail . . . and, then, at some units in actual operation. We shall be glad to send you a copy of the bulletin, without cost or obligation . . . and, also, tell you where there are some Farrel speed increasers installed in your locality.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Portland (Oregon), Los Angeles, Salt Lake City, New Orleans

OIL FIELD REPRESENTATIVES:

Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla.
V. W. Osborne, 860-A M & M Building, Houston 2, Texas

Farrel-Birmingham®

FB-678

J&L STEEL

TURN IN YOUR SCRAP — HELP BALANCE STEEL PRODUCTION!

You have some of the Mesabi Range cluttering up YOUR plant!

The iron and steel scrap in *your* operation—old machinery, parts, fixtures, etc.,—is worth twice its weight in precious Mesabi iron ore. Today this scrap is a vital natural resource. *Maximum steel production is impossible without it.* Every pound of scrap you can salvage is needed to help meet today's record demand for the steel to build a strong defense and to meet civilian needs.

COMB YOUR OPERATION FOR STEEL SCRAP NOW!

No matter what business you're in, you probably have more scrap than you realize. Appoint a responsible man to round it up. Set a date to have the job done. Your local scrap dealer will pay you for the scrap you collect. He'll speed it back into production. Act now. The need is urgent.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

LEE C. Moore CANTILEVER MASTS

THE MODERN WAY TO DRILL TO ANY DEPTH....

Lee C. Moore Masts are easy to move and erect. The variety of sizes makes it possible for you to select the one you need. There is a correct size for depths to more than 15,000 feet. Wherever oil is found Lee C. Moore Masts have proved to be the efficient, modern way to drill to any depth.

LEE C. MOORE CORPORATION

TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT • WICHITA • CENTRALIA • PITTSBURGH

Export Office — 9 Rockefeller Plaza, New York 20, N. Y.

They Say—

Oil and Investment

". . . In the final analysis, the only proof of oil is the drilling of a well and the complete testing of all prospective horizons. The odds are high, and on the basis of discoveries in Alberta from 1947 to 1950, inclusive, the ratio is one successful commercial wildcat well for every 23 drilled. . . .

"As matters stand, the round figure of one success in every 20-odd tries still seems to be fairly applicable. Even at that, it is an improvement over the vital statistics prior to 1947. It was after 133 dry holes that my own company made the discovery of crude oil at Leduc!

"The slim chances of success on any single drilling venture drive home the old saying about putting all one's eggs in one basket. Obviously, exploration must be undertaken on a long-time basis in areas with the general geological requirements necessary to oil occurrence, in order to reduce the wildcatting odds. Also, just as the insurance fraternity splits up a large and risky underwriting by means of reinsurance, it is the practice to disperse interest in a number of exploratory wells rather than a one-time interest in a single well.

"This, of course, is one of the reasons why many of the exploration companies are quite large in size, and why many of them are integrated with other phases of the oil business. Size and integration both help to spread the risk and enable the organizations to withstand the long string of failures which are probable in this sort of undertaking. This feature of hedging the risk is typified in the industry by the common participation deal and joint operations, where a number of operators divide the cost and divide the risk. . . ."

W. O. Twaits, director, Imperial Oil, Ltd., before the Montreal Kiwanis Club.

Save the Wealth

"We ought to keep Nebraska's wealth for Nebraskans and not allow oil to be piped out of the state."

C. V. Price, chief of the Nebraska division of resources, speaking in Omaha.

Answer to the $64 Question

". . . Whereas, in 1945, due to a shortage of petroleum products, the public was subjected to all of the inconvenience of rationing, today, in the face of an increased demand amounting to 48 per cent, we now have an adequate supply to meet all present requirements, and to spare.

"How, then, did this come about? This is the $64 question, the answer to which should be understood by every American. Whether or not it is understood by our American people will determine in the years to come not only how we shall live—but possibly whether we shall live at all.

"The answer is a simple one. Every member of our industry, big and little, with scarcely an exception, has been plowing back into plant and equipment all the money that they could borrow or earn to meet the public's needs. It is a story of the profit system and demonstrates that profits in our industry have not been excessive, and that whatever they are they have operated primarily in the public's interest.

"We forget that there is no such thing as a profitless economy, whether it be private, socialistic, or totalitarian. No matter under what kind of a system our public is served, the cost of expansion and improvement must be financed out of profits, in the long run.

"It is significant that the 30 largest oil companies in our country earned a total profit in the 4-year postwar period of 1946-49 of $5,227,000,000, while during the same period they spent on new capital investment a total of $8,-

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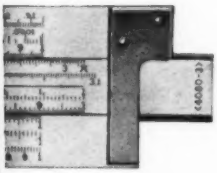
take a **CLOSER LOOK** *at*

mechanical properties



In apparatus where tubing must withstand high internal pressures at elevated temperatures, *mechanical properties* of the tubing-steel are important determinants of wall-thickness and size.

Evidently, any lasting improvement in the physical properties of a given steel will allow the designer a greater latitude in the selection of tubing, with possible advantages in the reduction of weight and cost.

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Complete details of the tests are covered by Alloy Letter No. 263, available on request.

B&W SEAMLESS and WELDED TUBES

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256,000,000, some $3,000,000,000 more than they earned. The difference had to be made up through borrowing and other sources. . . ."

A. A. Stambaugh, chairman of the board, Standard Oil Co. (Ohio) before the North American Gasoline Tax Conference, Columbus.

No More Gas Available

"It is my opinion that any sizable new interstate pipe-line construction will be over when projects now outstanding on Federal Power Commission authorizations are completed, because there is no gas available to support further expansion.

"Existing pipe lines will have to buy additional gas every year in order to keep present lines filled, and if they are unsuccessful in contracting for new supplies, there will be further curtailments of service in nearly every area beginning about 1960."

Harrington Wimberly, member, FPC, Washington, before the Texas Independent Producers and Royalty Owners Association, Tyler, Tex.

CALENDAR

October

Third Oil Recovery Conference, Cowden Junior High School Auditorium, Midland, Tex., a symposium on the Spraberry trend fields of West Texas, October 19-29.

American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York City, January 21-25.

Oklahoma Institute of Technology, diesel power-plant operators' conference, Oklahoma A. & M. College, Stillwater, Okla., October 22-25.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 23-26.

Fifteenth Penn State Technical Conference on Petroleum Production meeting at State College, Pa., October 24-26.

Society of Exploration Geophysicists, eastern regional meeting, Webster Hall Hotel, Pittsburgh, October 25.

American Institute of Mining and Metallurgical Engineers, petroleum branch, annual meeting of West Coast chapter, Elks Club, Los Angeles, October 25-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

National Petroleum Association, joint meeting of Department of Standards and Tests, and Department of Manufacture, Emory Hotel, Bradford, Pa., October 29; and Arlington Hotel, Oil City, Pa., October 30.

National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, October 29-31.

American Institute of Mining and Metallurgical Engineers, fall meeting of all branches in connection with Mexican Bureau of Mines, Hotel Del Prado, Mexico City, October 29-November 3.

American Society for Testing Materials, northern California district, San Francisco, October 31.

Society of Automotive Engineers, **fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.**

November

Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Roosevelt Hotel, New Orleans, November 1-2.

American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, annual joint meeting, Pacific sections, Ambassador Hotel, Los Angeles, November 1-2.

American Institute of Mining and Metallurgical Engineers, sixth annual off-the-record meeting, Petroleum Branch, Pittsburgh section, William Penn Hotel, Pittsburgh, November 2.

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Southwest Research Institute, second conference on coastal engineering, Rice Hotel, Houston, November 7-10.

American Society for Testing Materials, southern California district, Los Angeles, November 8.

Gulf Coast Association of Geological Societies, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

Petroleum Electric Power Association, twenty-third annual meeting, Shamrock Hotel, Houston, November 19-20.

Society of Exploration Geophysicists, regional meeting, Baker Hotel, Dallas, November 19-20.

Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex., November 20.

Mid-Continent Oil and Gas Association, annual board of directors meeting, Tulsa Club, Tulsa, November 20.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, May-

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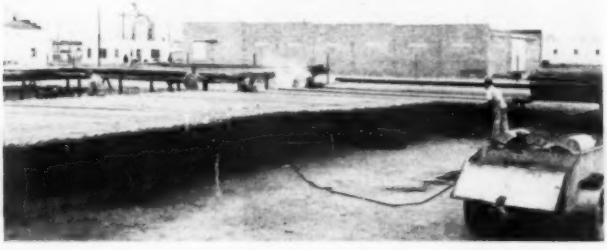
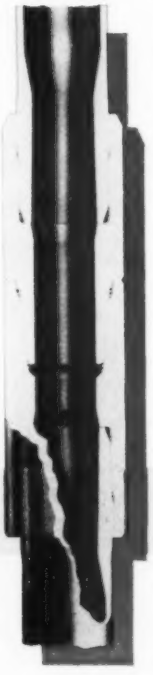


This crew is applying **REED** Super Shrink-Grip Tool Joints to a string of pipe for the Beardmore Drilling Company. Field application like this saves both transportation costs and lost rig time, making for lower drilling costs.



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flower Hotel, Washington, D. C., December 3-4.

Interstate Oil Compact Commission, annual meeting, Hotel Marion, Little Rock, Ark., December 11-12.

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

1952 Meetings

January

Society of Automotive Engineers, annual meeting, Hotel Book-Cadillac, Detroit, January 14-18.

American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York City, January 21-25.

February

American Society for Testing Materials, Committee D-2 on petroleum products and lubricants, Shoreham Hotel, Washington, D. C., February 3-8.

Missouri Petroleum Association, annual convention and trade exhibit, Jefferson Hotel, St. Louis, February 4-6.

American Petroleum Institute, Division of Marketing, lubrication-committee meeting, Hotel Book-Cadillac, Detroit, February 18-19.

Wisconsin Petroleum Association, twenty-sixth annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 26-27.

American Association of Petroleum Geologists, Rocky Mountain Section, second annual convention, Salt Lake City, February 28-29.

March

American Society for Testing Materials, spring meeting, Hotel Statler, Cleveland, March 3-7.

American Petroleum Institute, Division of Production, southwestern district, Washington-Youree Hotel, Shreveport, March 5-7.

National Association of Corrosion Engineers, eighth annual conference and exhibition, Galvez Hotel, Galveston, Tex., March 10-14.

American Institute of Chemical Engineers, regional meeting, Atlanta, March 16-19.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, Kans., March 19-21.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 31-April 2.

April

American Petroleum Institute, Division of Production, eastern district, Hotel William Penn, Pittsburgh, April 2-4.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 8-10.

American Institute of Electrical Engineers, District 7 meeting, Hotel Jefferson, St. Louis, April 15-17.

American Petroleum Institute, Division of Transportation, pipe-line conference, Blackstone Hotel, Fort Worth, April 21-23.

American Petroleum Institute, Division of Production, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., April 24-25.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas - Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: October 29, regular meetings. Louis Sherry's: December 8, Christmas dinner dance, Hotel Pierre.

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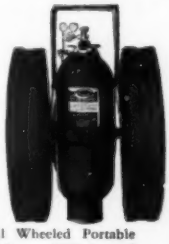

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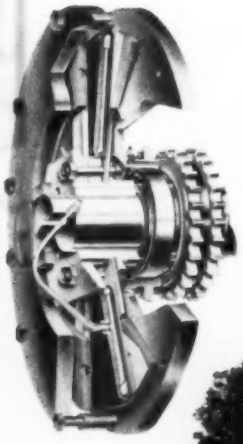

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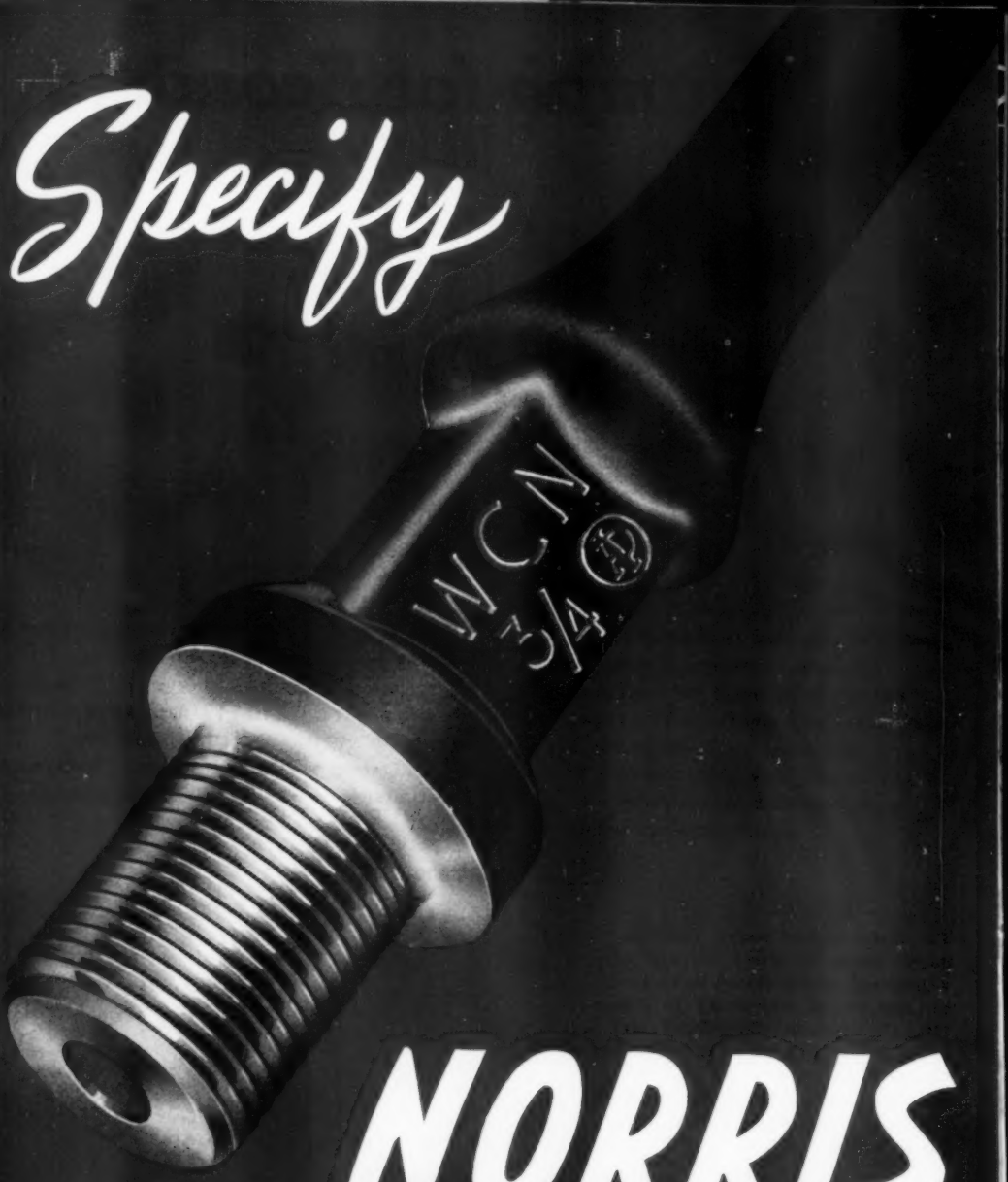

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JOURNALLY Speaking

Truth or Consequences

AS soon as we get around to it we must send a scout out to New Mexico to give us a report on a town which, according to the Post Office, is officially named Truth or Consequences.

A number of our subscribers have been moving there recently, and we want to find out whether there is an important oil development in the vicinity or whether they are inexorably drawn there by the implications of the name.

In some ways, Truth or Consequences would seem to be an ideal name for the headquarters of stock promoters and royalty brokers, or even for scouts and geologists. Not that such men don't always tell the truth, the whole truth, and nothing but the truth, but because the final word in the title would keep them conscious of what would happen if they should slip. Also, their clients ought to have a comfortable feeling of reassurance on noting this address on the postmark and letterhead.

If the movement of oil men to Truth or Consequences should develop into something of a stampede, our favorite oil publication might even consider moving out there too, in order to emphasize to our readers that we are well aware of the penalties of defection from the shrine of Truth. But we want to investigate pretty carefully. It just might possibly turn out that Truth or Consequences is the site of the state pen.

Ubiquitous Petroleum

THERE'S a man out in California, we have been informed, who has a physical allergy to petroleum. He breaks out in a rash whenever he gets near any petroleum product. It's not that he's a coal dealer or a horse-and-buggy man; he just has a medical idiosyncrasy by which petroleum affects his skin. Fortunately, the malady is rare.

The poor guy has an awful time, but he might be useful to the Oil Industry Information Committee as a walking demonstration of how petroleum products enter into every phase of modern living. This fellow not only can't go near a filling station—he starts to itch after a short ride in a car or bus. He can't use detergents, quick-drying inks, or even medicines and lotions with a petroleum base. He just can't get away from petroleum. We wonder how he survived Oil Progress Week.

On second thought, however, maybe the O.I.I.C. had better stay away from him. Its job is to make people aware of petroleum without causing irritation.

Cleaner Air

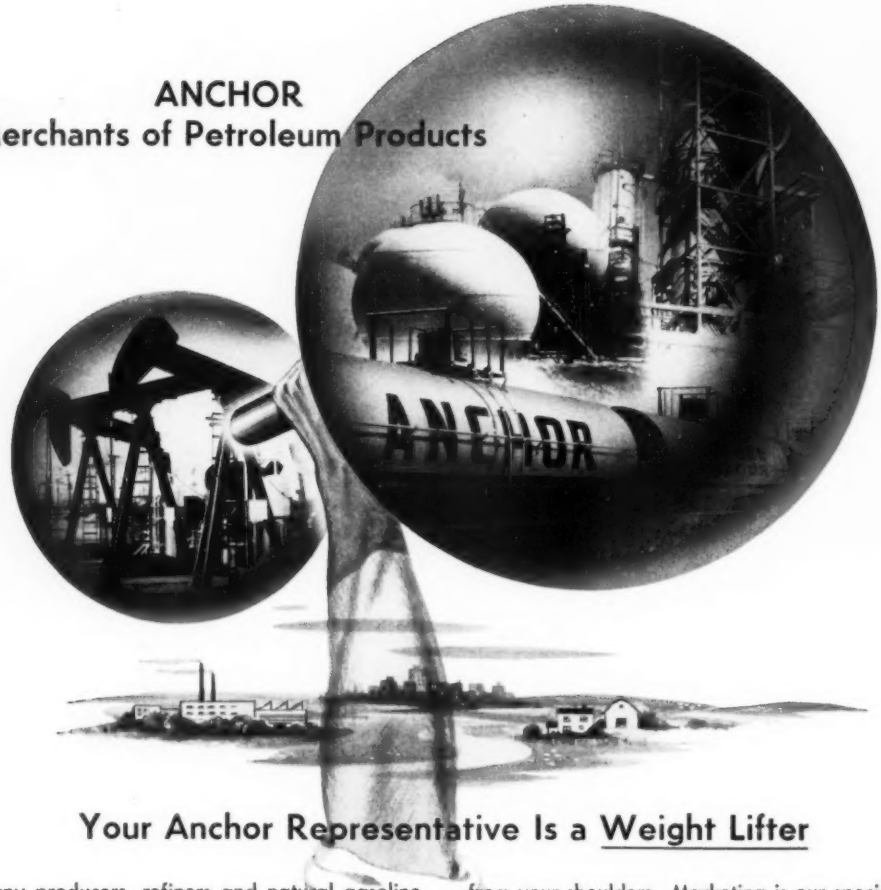
HAD you noticed it? This is Cleaner Air Week. If we were of a suspicious and unkind nature we might be inclined to think that the Air Pollution and Smoke Prevention Association of America, which sponsors it, had some ulterior motive in scheduling Cleaner Air Week immediately after Oil Progress Week, particularly since a large portion of its members are connected with the coal industry.

However, we note that a number of oil companies also are members, so we banish the snide suggestion that the purpose might be to clear the atmosphere after all the oil propaganda of the preceding week. The A.P.S.P.A.A. appears to be entirely sincere and earnest in its campaign to keep us from inhaling noxious fumes and smoke. Its methods are to foster better combustion practices for all types of fuels and to enhance cooperation between civic authorities and industrial plants which are prone to belch airborne contaminants into the nostrils and onto the window curtains of the long-suffering citizenry.

A few years ago, we imagine, the oil industry might have laughed off any idea that it cooperate in this movement, probably making the smug suggestion that the way to have cleaner air is for everybody to burn oil or gas instead of coal. But recently, in Los Angeles and other places, the oil industry has been blamed for the curse of smog. Oil men have proved that it isn't their fault, but in doing so they have pitched in to help their communities find the cause and cure of air pollution, thus making themselves better neighbors. So maybe the juxtaposition of Oil Progress Week and Cleaner Air Week is a happy sequence.

—Henry D. Ralph

ANCHOR
Merchants of Petroleum Products



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duplex

DUPLEX

.....a good name to remember

Baker DUPLEX Cement Wash-Down Whirler Float Shoe — Product No. 360

WHAT YOU CAN DO WITH BAKER DUPLEX EQUIPMENT

successfully cement liners, combination strings, and perform certain types of two-stage cementing.

cement blank sections of pipe below a perforated section, without any need to use auxiliary equipment.

wash out cavings ahead of the string when setting a liner. Without DUPLEX Equipment you can circulate only through the topmost perforations—with DUPLEX you can circulate clear to bottom.

you can control the amounts of materials used, and (without change) run caustic or oil, then run plastic, in sequences and quantities as desired.

you eliminate the need for auxiliary equipment (such as retainers or retrievable cementers) when you use Baker DUPLEX.

you can use DUPLEX equipment either with or without a liner hanger.

you have complete control of the liner at all times when DUPLEX Equipment is used. The liner can be raised or lowered, and is positively held down in place while cementing.

a bridging ball can be dropped (after cementing) and circulation carried on above the DUPLEX Equipment without disturbing the green cement.

Baker Combination Product No. 383 with a DUPLEX Whirler Float Collar. Cement is held above the Metal Petal Basket.

How DUPLEX Equipment is made

DUPLEX Float Shoes and Collars are similar to other Baker Float Shoes and Collars in most features, but have a female left-hand thread assembly (of drillable cast iron) accurately anchored just above the Back-Pressure Valve. By means of a mating male Left-Hand Square Thread Sub, the cementing string is easily connected to (or disconnected from) the DUPLEX Shoe or Collar.

How DUPLEX Equipment Operates

In simple liner work, a DUPLEX Wash-Down Whirler Float Shoe is connected to the bottom joint and the balance of the liner is run into the well, with the last joint held in slips or clamps. A cementing string of sufficient length then is run to connect the male Left-Hand Square Thread Sub to the female left-hand assembly in the shoe, to form a quick, fluid-tight connection.

The portion of the cementing string above the liner is then run, with the DUPLEX connection carrying the weight of the liner. After cementing, the back-pressure valve prevents any flow-back of cement slurry placed outside the liner. The cementing string is then disconnected by rotating to the *right;* excess cement washed out; and the cementing string removed from the well.

Various combinations of Baker DUPLEX Equipment are used to perform more complex operations, such as cementing behind liners at different levels; cementing above and below cavities; between producing zones; and similar work.

The Baker representative or office nearest you is available to discuss proper use of Baker DUPLEX Equipment in your well completions.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

BAKER

GUIDING, FLOATING AND CEMENTING EQUIPMENT

DUPLEX

Caution Light for Gas

Since the end of the war the business of selling southwestern gas in new markets of the East and North has been going full speed ahead, with green lights all the way. But now caution lights are beginning to flash. The rate of expansion may have to slow down. Some observers predict it will grind to a halt within a few years.

Demand is catching up with supply, on a long-range basis. The fact that the ratio of reserves to consumption is declining is not too alarming, in itself, for this has happened in the case of oil and has always been offset by discovery of new reserves. There are now large proven but untapped reserves of natural gas and more reserves will be discovered.

The outstanding development is the tremendous growth in demand, both actual and potential. Sales of natural gas this year are about 15 per cent above last year. Increases of this magnitude have been going on for several years and are definitely scheduled for two or three more. But every community and industry using natural gas wants more of it and those not now served are demanding it.

In most areas natural gas undersells other fuels on a heat basis. But even a somewhat higher price would not halt the demand because of the superiority of gas from the standpoint of convenience and cleanliness and because it is more practical than any other fuel in many industrial processes.

The future demand for natural gas everywhere thus seems insatiable. But there is another factor. Instead of waiting for gas to be brought to it, industry is moving into the area where gas is produced. Petrochemical plants, which use gas as a raw material, and others which use it for power or for processing, are already consuming enormous quantities in the states where it is produced. The rate at which southwestern gas reserves are being committed to local industrial use is phenomenal.

Looking ahead 5 or 10 years, it is not at all impossible that the reserves of natural gas—and they will be much larger than at present—will all be dedicated to existing interstate pipe lines and to local uses. This means that sections of the country not already served by trunk lines may have to do without natural gas, and customers of existing lines could expect no very large increases in supply.

The normal result of short supply and heavy demand is an increase in price, and an upward trend in gas prices appears inevitable. Higher price, in turn, will increase the supply by encouraging discovery and development and the construction of gathering lines to smaller fields and natural-gasoline plants now flowing residue gas.

But price alone will not solve the problem, for more than simple economics is involved. Natural gas has become a matter of wide public interest, and some real industrial statesmanship will be required to keep it from becoming a political football.

THIS WEEK

WORLD'S LARGEST CAT CRACKER ON STREAM.—Shown at left in this night view of Gulf Oil Corp.'s Port Arthur, Tex., refinery is the world's largest catalytic cracking unit, which went on stream this week. The 63,000-bbl. unit, as high as a 22-story building, boosts capacity of the refinery to 275,000 bbl. daily.

INDUSTRY—I.P.A.A. approves resolution calling on OPS to increase ceiling price on crude oil to help offset increased operational costs. . . . ¶Outgoing president of association declares I.P.A.A.'s big task is to reaffirm public's faith that all future petroleum needs can be met, but warns industry must be free of governmental interference. . . . ¶Products demand will average 8,025,000 bbl. daily this winter, I.P.A.A. predicts. . . . ¶Ernest O. Thompson named recipient of A.P.I.'s Gold Medal Award.

PRODUCTION—More oil can be found as long as man has incentive to venture, vision, freedom to explore, Pratt tells A.A.P.G. group. . . . ¶Spraberry rock and fractures discussed at Midland symposium. . . . ¶World crude-oil production continues upward despite Iranian shutdown, with daily average of 11,710,800 bbl. in August. . . . ¶Snyder, Tex., gasoline plant dedicated. . . . Will produce 500,000 gal. of liquid products daily from 65,000,000 cu. ft. of casing-head gas. . . .

AVGAS—PAD issues two new orders on alkylate, TEL as result of sharp decrease in stocks of aviation gasoline. . . . ¶DPA ranks expansion of avgas production as one of 10 most vital programs. . . . ¶ASPPA asks proposals from refiners covering rehabilitation or construction of alkylate plants to help meet military needs. . . . ¶DPA approves accelerated amortization for new aviation-gasoline facilities. . . .

ECONOMICS—Reduction in octane numbers small for both premium, regular gasolines during third quarter, Du Pont survey reveals. . . . ¶Exports of crude and products averaged 523,000 bbl. daily for August, setting new postwar record, Department of Commerce reports. . . . Imports averaged 745,000 bbl. daily, lowest since February. . . .

CORROSION—N.A.C.E. holds tour of inspection of installations in Permian basin to check on various corrosion-resisting materials, methods. . . . ¶South-Central regional meeting of N.A.C.E. hears of ways to hold corrosion problem to a minimum. . . .

WASHINGTON—Congress adjourns after 10-month session with pleasantly low score so far as oil legislation is concerned. . . . Tidelands question still remains unsettled. . . . ¶New restrictions on use of sulfur will become effective November 1. . . . ¶NPA eying possibility of stiffer controls on naphthenic acid. . . .

REFINING—Gulf Oil Corp. puts world's biggest cat cracker on stream at Port Arthur, Tex., refinery. . . . ¶A.I.Ch.E. group told how to make heat exchangers perform properly. . . . ¶Canadian Oil Companies, Ltd., opens new $2,000,000 lube, grease-manufacturing plants at Montreal. . . . ¶Mercury Oil Refining launches $3,195,000 construction, expansion program at Oklahoma City refinery. . . .

ACTIVITY—Crude production for week ended October 20 averaged 6,269,415 bbl. daily to set a new all-time record, up 7,480 bbl. daily from previous high for week ended October 6. . . . ¶Total well completions dropped 26 wells for the week to 854. . . . Wildcat completions at 180 dipped below same week last year for first time since June. . . .

TRENDS—Rotary rigs operating in the United States and Canada passed the 3,000 mark on October 15. . . . A new high was set by rigs operating in United States at 2,878. . . . ¶Average number of rotary rigs in United States this year has been 2,445 compared with 2,101 for same weeks in 1950. . . .

Oil Needs Can Be Met

I.P.A.A. must reaffirm public's faith, Warren says, but warns industry should be free of government interference

Henry D. Ralph

HOUSTON.—The Independent Petroleum Association of America at its annual meeting here October 22-23 set for itself the task of reaffirming the faith of the American people in the ability of the oil industry to meet all future demands if kept free from government interference and planning.

This keynote was set by J. Ed Warren, outgoing president, and was echoed by other speakers and in many committee reports. It formed the basic premise of the cost-study report of the economics committee which presented figures to show that with adequate materials and a fair price for crude oil the industry can discover and develop much greater reserves during the next few years. *(See "Crude Price Battle Looms.")*

Faith in the ability of industry to meet the nation's needs without government direction will be difficult to maintain during this period of a partially controlled economy caused by the international situation and requires special efforts on the part of independent businessmen, Warren declared.

Noting that the I.P.A.A. was founded years ago on the principle of faith in the domestic industry to meet the nation's oil needs, Warren said that the association has developed a realization of the responsibility that independent oil men have in maintaining conditions under which the industry can operate effectively. He pointed to various predictions made during the past 20 years to the effect that the national economy in general and oil production in particular had reached a peak or a static level and that further expansion was impossible without a controlled economy.

"Great experiment."—"Our nation is launched on a great experiment—an experiment that was imposed upon us by the communistic threat to our national security," Warren said. "We are attempting to maintain an economy that is partly wartime and controlled and partly peacetime and free. The conditions responsible for this situation will last for an indefinite and unpredictable time.

"The faith in our American principles will be taxed to the utmost to maintain a balance in this semiwar condition. The necessity of controls to obtain munitions for war will of themselves generate the urge for further controls because of the new bottlenecks and inequities created. The pressures for increasing controls multiply and if not strongly and ably resisted will grow into an economy that will deprive us of essential business freedoms and there is no V-Day to call a halt."

In best position.—Independents not only have the most at stake in resisting unnecessary controls but they are in the best position to resist them because of the influence they can bring to bear on the public and on government officials, Warren said. He particularly urged them to volunteer for service on the staff of Petroleum Administration for Defense and other federal agencies in order to make sure that the industry viewpoint is maintained in Washington.

Thompson issues warning.—Much the same plea was made by Commissioner Ernest O. Thompson of the Texas Railroad Commission, and who this week was named recipient of the Gold Medal A.P.I. award, in warning that in the event of another war the military will need 4,000,000 bbl. per day of petroleum products.

This huge requirement can be met by the oil industry if it is given the steel with which to drill more wells and is kept free of oppressive taxation and other restrictions on its activities, Thompson asserted. He urged the independent oil men to make sure that the public understands that retention of the depletion allowance in the tax law and of other economic incentives for finding and producing oil will assure sufficient quantities for years to come.

"Given a continuance of the opportunity which this time-tested method has provided, in my opinion the industry will continue to find more oil as needed," Thompson said. "It will meet the plea of the Government for additional oil-producing capacity to supply the needs of defense. We can supply the 4,000,000 bbl. per day for defense, great though that estimate may be. I think we will need that much."

New president.—New president of I.P.A.A. is Charlon H. Lyons, independent operator of Shreveport, who is chairman of the association's committee on Western Hemisphere oil study, and vice president of the Louisiana-Arkansas Division of the Mid-Continent Oil and Gas Association.

New vice presidents elected were Theodore N. Law, Tulsa, for eastern Oklahoma; T. H. McCasland, Duncan, Okla., for western Oklahoma; Bryan W. Payne, Tyler, Tex., Northeast Texas; Creston Alexander, Dallas, North-Central Texas; E. L. Ames, San Antonio, Southwest Texas; F. J. Danglade, Lovington, N. M.; Don M. Reese, Jackson, Miss.; Kenneth P. Milliken, Lancaster, Ohio; J. W. Leonard, Mount Pleasant, Mich.; Zack Brinkerhoff, Jr., Casper, Wyo.; Lawrence Vander Leck, Los Angeles, Calif.; Paul W. Neuenschwander, Sisterville, W. Va.; Bayard H. Faulkner, New York City, eastern New York; M. E. Mitchell, Wellsville, N. Y., western New York.

Elected as new members of the I.P.A.A. executive committee were T. Glenn Caley, Saginaw, Mich.; Frank B. Lefebre, San Antonio; E. B. McGehee, Jackson; Harry Nowlan, Evansville, Ind.; D. T. Ring, Columbus, and Joe Zeppa, Tyler, Tex.

HEADS I.P.A.A.—Charlton Lyons, second from right, of Lyons, Prentiss & McCord, Shreveport, was elected president of the Independent Petroleum Association of America at the annual meeting in Houston this week. Other officials are, left to right: Russell Brown, Washington, general counsel; J. Ed Warren, King, Warren & Dye, Midland, Tex.; outgoing president; and at right, Fred W. Shield, independent operator, San Antonio, past president.

Crude-Price Battle Looms

I.P.A.A. approves resolution calling on OPS for higher price for crude to help offset rising operational costs

Henry D. Ralph

HOUSTON.—A resolution asking the Office of Price Stabilization to increase the ceiling price on crude oil was adopted by the Independent Petroleum Association of America here October 22.

It called on OPS to take immediate action so that price ceilings for crude petroleum be no longer at disparity with the general economy. Such a move would provide funds and incentives needed to insure the maintenance of adequate oil supplies.

Ground work for this action was laid by the I.P.A.A. at its annual meeting here.

A major weapon in the coming battle will be the report submitted to the association by the committee on cost study, an exhaustive document showing that producing capacity cannot be sustained without increased exploration and drilling and that higher prices are an important element achieving this. This is only a preliminary report, however, and the committee is now engaged in a study of the cost of developing new reserves to replace the oil now being produced.

The keynote of the I.P.A.A. campaign was sounded by Minor S. Jameson, Jr., assistant to the president of the association, who declared that the future supply of oil in this country depends on the maintenance of a healthy competitive industry. Once freed from government controls of World War II, he said, the industry expanded producing capacity from less than 5,000,000 bbl. daily to more than 7,500,000 bbl. daily at the present time, a capacity which many authorities thought impossible a few years ago.

50,000 wells annually.—To keep producing capacity abreast of anticipated demand it will be necessary to drill 50,000 wells annually during 1952 and subsequent years, Jameson declared, estimating that this would raise domestic crude-oil producing capacity to 8,270,000 bbl. daily by 1955.

The basic story here, Jameson said, is "maintain the conditions essential to greater activity by a healthy oil industry in the United States and that industry will demonstrate its ability to keep this nation a land of plenty as to oil and gas."

This theme was developed in great detail by the cost-study report which contended that the present price ceiling on crude oil threatens to prevent the development of adequate reserves. It drew heavily on war-time history to show that a low price ceiling prevents discovery and development of sufficient reserves to meet increasing requirements for petroleum products.

More activity needed.—Despite the present high level of drilling, the report said, exploration activity must be stepped up if all oil demands are to be met. So far this year, it said, drilling has been at the rate of 19.4 wells per million barrels of oil produced compared with 22.1 wells per million during the same period last year, a decline of 12 per cent in exploration and development activity necessary to maintain productive capacity.

The effect of high costs of finding new oil reserves is shown by the fact that in 1946 the new reserves discovered per foot of exploratory drilling was less than one-fifth of the 1936-39 figure, the report asserted. It is axiomatic that each barrel produced today should, at the very minimum, provide sufficient capital to permit the discovery and development of normal replacement requirements, it declared, but the cost of finding and developing new oil fields to replace those now being depleted is considerably more than the cost of fields from which a large portion of current production is being obtained.

Reserve replacement.—Replacement of crude reserves is the principal operation in the petroleum industry, but bookkeeping costs and earnings statements of integrated companies do not show true costs and the industry needs assurance that it can replace its assets, not just its dollars, the report asserted.

The committee outlined many factors of increasing costs but is still engaged in working up details of the cost of discovering and proving new reserves to replace those now being produced. Undoubtedly the completed report will be presented to OPS in support of a request for higher ceilings on crude prices.

Products Demand to Rise

U. S. domestic, export needs will average 8,025,000 bbl. daily this winter, up 6.6 per cent, I.P.A.A. predicts

HOUSTON.—Demand for petroleum products in this country for both domestic and export needs will average 8,025,000 bbl. daily this winter or 6.6 per cent higher than last winter, it is forecast by the economics committee of the Independent Petroleum Association of America.

UNITED STATES PETROLEUM SUPPLY AND DEMAND FORECAST*
(Thousands of barrels daily)

	3rd Q. 1951	4th Q. 1951	Year 1951	1st Q. 1952	2nd Q. 1952	3rd Q. 1952	4th Q. 1952	Year 1952
Total demand:								
Gasoline	3,345	3,110	3,099	2,880	3,415	3,465	3,235	3,249
Kerosine	250	460	356	510	265	255	500	382
Distillate	955	1,510	1,286	1,870	1,050	975	1,605	1,375
Residual	1,410	1,700	1,620	1,875	1,555	1,445	1,705	1,646
Other	1,225	1,100	1,104	1,035	1,155	1,210	1,095	1,123
Total demand	7,185	7,880	7,465	8,170	7,440	7,350	8,140	7,775
Exports (included above:								
Gasoline	125	120	100	95	95	55	55	75
Kerosine	25	20	17	20	15	5	5	11
Distillate	80	70	59	70	60	25	25	45
Residual	100	80	75	75	65	35	35	53
Other products	85	80	76	75	75	55	55	65
Crude	80	80	83	80	70	55	55	65
Total exports	495	450	410	415	380	230	230	314
Domestic demand	6,690	7,430	7,055	7,755	7,060	7,120	7,910	7,461
Total stock change	+355	—203	+92	—423	+299	+391	—272	—1
Total new supply required	7,540	7,677	7,557	7,747	7,739	7,741	7,868	7,774
Closing stocks (million bbl.):								
Gasoline	112.4	121.5	121.5	141.5	127.0	114.5	121.5	121.5
Kerosine	34.0	24.6	24.6	15.0	25.0	34.5	24.5	24.5
Distillate	97.2	84.3	84.3	44.0	66.0	96.0	84.0	84.0
Residual	47.7	44.9	44.9	37.5	41.5	51.0	45.0	45.0
Other products and natural gasoline	89.8	87.1	87.1	87.8	92.0	89.0	87.0	87.0
Crude	254.0	254.0	254.0	252.0	253.5	256.0	254.0	254.0
Total stocks	635.1	616.4	616.4	577.8	605.0	641.0	616.0	616.0
Runs to stills	6,566	6,654	6,528	6,689	6,684	6,717	6,790	6,721

*Prepared by the Economics Committee of the Independent Petroleum Association of America.

The peak of the demand will come during the first quarter of 1952, when it is expected to reach 8,170,000 bbl. daily. Total demand for 1952 will average 7,775,000 bbl. daily of all products, which is 4.2 per cent higher than the estimated 1951 average.

The forecast was based on the assumption that Iranian operations will be resumed by July 1, 1952, which the committee admitted is an arbitrary assumption. The Iranian shutdown caused a substantial increase in exports from this country, the committee said. But domestic demand has been lower than was anticipated so the impact on the United States industry has not been material.

The forecast was based on the assumptions of normal weather, continued high industrial activity, no new international developments, and continued shutdown in Iran until next summer.

New supply. — New supply needed during the fourth quarter of this year will average 7,677,000 bbl. daily, compared with 7,540,000 bbl. daily during the third quarter. During the third quarter the supply was made up of 6,230,000 bbl. of domestic crude production, 535,000 bbl. of natural gasoline and allied products, 528,000 bbl. of imported crude, and 247,000 bbl. of imported refined products.

The committee did not indicate the probable source of the additional supply needed in coming months, but forecast that total supply needed in this country would rise to 7,868,000 bbl. daily during the fourth quarter of next year and would average 7,774,000 bbl. daily during 1952.

Thompson Honored

Texan awarded A.P.I. medal of achievement

NEW YORK.—Ernest O. Thompson, one of the nation's most vigorous proponents of oil and gas conservation, was named this week as the 1951 recipient of the American Petroleum Institute's Gold Medal for Distinguished Achievement.

He will receive the award in Chicago November 17 at the A.P.I. meeting from W. Alton Jones, president of Cities Service Oil Co. and chairman of the A.P.I. board of directors.

Details of the inscription on the scroll accompanying the medal will be withheld until it is read publicly before the A.P.I. assembly.

Active career.—Thompson is a member and past chairman of the Texas Railroad Commission and is credited with exercising a tremendous influence in the development of conservation policies to protect the nation's petroleum reserves.

He is a founder of the Interstate Oil Compact Commission and played an aggressive role in perfecting secondary-recovery techniques. A member of the Texas National Guard since prior to World War I and now commanding general, Thompson was appointed President Roosevelt's personal representative to the World Petroleum Congress in Paris in 1937 and was one of two official representatives of the Government at the congress held at The Hague this year.

ERNEST O. THOMPSON

The veteran official was appointed to the Texas Railroad Commission by Gov. Ross Sterling in 1932. He immediately proved himself invaluable to the state and to the oil industry, then threatened by bankruptcy due to the flood of oil from East Texas field. When the United States Supreme Court ruled against use of martial law in the oil fields, Thompson appeared before a special session of the state legislature and recommended oil-conservation legislation which was promptly passed. The Texas National Guard then in the fields moved out, and Thompson moved his proration headquarters in.

Later, in opposition to efforts made in courts to show that proration was against the public interest, Thompson conducted a personal survey and proved that, instead, it led to far greater ultimate recovery.

In addition, his prompt use of police powers was credited with stopping cold railroad shipments of "hot oil" from Texas.

SOUTHWEST

How to Find More Oil

New discoveries will continue if man has vision, freedom to explore, incentive to venture, Pratt tells A.A.P.G.

Philip C. Ingalls

AUSTIN.—Big oil fields lie undiscovered today because oil finders are hampered by the very knowledge that has found other fields, Wallace E. Pratt, philosopher-geologist, told 400 geologists here October 18.

Oil will continue to be found as long as man has vision, the freedom to explore, and the incentive to venture, provided geologists are not too quick to condemn possible areas on the basis of false assumptions, Pratt declared. He spoke before the eighteenth annual meeting of the South Texas Geological Society and the 1951 regional meeting of the American Association of Petroleum Geologists.

Pratt's address did not deal with the aids and techniques now known or that may some day be known for finding oil; these were assumed. It dealt principally with mens' minds and also of social and political environments. He originally called his address "A Philosophy of Oil Financing" and later humbly added "An Approach Toward . . ."

Oil finders must reverse their present system of calling an area unfavorable for the accumulation of petroleum just because very little is known about that area and consider every province as potential oil country until it is positively proved to be unfavorable, Pratt said. Geologists and other trained oil finders must maintain a constant awareness of what they do not know, if they are to long continue to find new oil areas.

WALLACE PRATT

No freak of nature. — Pratt, former vice president and director of Standard Oil Co. (N. J.), was the first to point out that oil was not a freak of nature that occurred at only a few spots around the world but rather that the generation of oil was a natural process that might have developed almost anywhere at some time.

He cited a number of examples of how some of the world's largest oil fields had been found where the world's most competent geologists had said there was no oil.

Pratt pointed out that Kuwait, the biggest oil field in the world, went begging at a time when it could have been had for the cost of exploratory work, because the three big international companies that knew the most about the occurrences of oil in the

A.A.P.G. PRESIDENTS.—Presidents of the American Association of Petroleum Geologists at the eighteenth annual meeting of the South Texas Geological Society and the 1951 regional meeting of the A.A.P.G. in Austin. Left to right, with year elected to the presidency in parentheses: M. G. Cheney (1945), Ed W. Owen (1941), Frank A. Morgan (1951), F. L. Aurin (1942), C. L. Moody (1950), and Wallace E. Pratt (1920). Present at the meeting but not in the picture was Paul Weaver (1948).

Middle East were convinced that there was no oil in Arabia. It took a small company, a company new to the area that didn't know there wasn't any oil in Arabia, to initiate exploration that eventually opened Kuwait.

Pratt told how it had become an accepted fact that the Woodbine pinchout in East Texas had no oil, until it was discovered, that is; and how until very recently there were many who argued that there was no producible oil in the Uinta basin.

Many errors.—Pratt said that though by far the greatest amount of oil had been found by companies using skilled techniques, still there have been many grave errors on the part of most skilled geologists. He explained that this was because what little is known about the occurrences of oil often forms "mental shadows" that hide what we do not know.

For example, Pratt said, in estimating proven recoverable reserves, if what we know is small, an estimate of what is left will be small. He recalled estimates of oil reserves in this country, which as president of the A.A.P.G., he played a major part in setting back in 1921. The estimated remaining crude-oil reserve at that time, Pratt said, was 9 billion barrels of recoverable oil. Today, he pointed out, after 30 years of increasing production this country's crude-oil reserves are estimated to be over 25 billion barrels plus reserves of liquid-petroleum gases and natural gas.

This country has yielded 10 times as much oil per unit as the rest of the world, and Pratt credits our social and political environment with having played a tremendous part in this difference. Pratt considers oil finding a dual task—a task of the individual and a task of the community.

Five essentials.—Pratt's philosophy includes five essentials for an oil finder: (1) Faith (conviction that oil will be found at a given spot), (2) Persistence (not influenced by the laughs of others, (3) Venturesomeness (willing to take a risk and to be encouraged by his own enthusiasm, (4) Resourcefulness (ability to find places to dig for oil that have been passed or avoided by others), and (5) Imagination (imbued with vision).

Pratt added that if, in addition to having these qualities, a man is well trained in the modern art of oil finding, so much the better so long as he does not let his knowledge obscure what he doesn't know.

An oil finder, Pratt said, cannot know all the answers, so he must always be alert to what he doesn't know. He must never assume his knowledge is complete, because it won't be. His deductions may be logical, his conclusions plausible in the light of what is known today, but, declared Pratt, that doesn't make them right in the light of what may be known tomorrow.

Spraberry Fractures

Theories of pattern and origin receive special attention at symposium; development methods of vast area reviewed

Roy F. Carlson

MIDLAND, Tex.—After a day and a half of papers and discussions on Spraberry rock and fractures by well-informed speakers, no one is sure whether the formation is all it is "cracked up" to be.

But there is one thing certain—Spraberry means fractures, and plenty of them, to West Texas oil men.

The meeting was held here under the sponsorship of the Texas Petroleum Research Committee, an organization supported by the Texas Railroad Commission, University of Texas, and Texas A. and M. College. The committee drew talent from the West Texas Geological Society, the local section of American Institute of Mining and Metallurgical Engineers, and other interested organizations and firms. Nearly all of the speakers have been very closely associated with development in the tremendous Spraberry trend.

History.—Of course the first conclusion to reach is that the Spraberry trend in area is probably the biggest oil field ever with 800,000 acres proven, about 1,000,000 total proven or semiproven, and perhaps another 1,000,000 acres possible.

This size productive area has been reached in just a few months less than 3 years from when the first Spraberry production reached the surface. Seaboard Oil Co. brought in this first well in what is known as Spraberry field, but it was Tex Harvey Oil Co.'s first well in what is now known as Tex Harvey field in March 1949 that started the big ruckus now in progress in the million-acre trend.

The primary concern of the symposium was the large blanket-type monoclinal kind of structure now being developed most thoroughly in Midland, Reagan, Upton, and Glasscock counties.

The symposium agreed that in order to get a Spraberry well there must be fractures leading to the well bore, either natural cracks, or artificially induced channels of permeability. It was also agreed that the Spraberry in areas is fractured naturally and to an intense degree in some instances. These fractures follow some pattern, too, according to most observers, but the exact pattern is yet to be determined.

Fracturing.—A suggested pattern for fracturing was offered by Dr. H. N. Fisk, of Humble Oil & Refining Co., based on observation of jointing in rocks that are observable on the surface. Jointing, according to geologists,

consists of a series of cracks or fractures in rock that follow a consistent pattern, with groups of fractures running parallel to each other and other groups intersecting these at some fixed angle. Some of these intersecting fractures are larger than others, and constitute major "sets" of joints; others are smaller and comprise minor joint "sets" parallel to the major jointing.

Dr. Fisk applied this theory to Tex Harvey field, and by plotting productivity of wells on a map showed that they could be aligned in a kind of jointing pattern. Wells drilled into the major sets of jointing would seemingly have a greater productive ability than those missing the jointing entirely or drilled into smaller sets of fractures.

Origin in doubt.—The origin of fractures is also somewhat in doubt. Apparently they are not due to earth movement according to observers, but are possibly due to recrystallization or shrinkage in the mass of the Spraberry formation itself. One of the theories advanced was that the Spraberry is formed of several large layers of shales, sandstones, and siltstones. During any recrystallization process, shrinkage in volume in siltstones would be much less than in shales, this theory supporting discontinuity of fractures across boundaries between shales and sand or siltstones.

There was disagreement over whether the more permeable portions of the Spraberry are sandstones or siltstones, the difference being primarily a measurement of grain size in the rock.

Drilling.—Drilling to the Spraberry takes an average of 33 days from spudding the well until it is placed on production. Two general casing programs are in use, with a two-string program being most common now. This program uses a short surface string, and one long oil string set on top of or above the top of the productive horizon. This program is adopted partly to save scarce casing, since the other general plant uses three strings of casing.

The mud program generally is simple, with most operators using a clear-water-base mud from the grass roots. Sometimes gels are added, and if the salt string of casing is omitted, drilling is normally done with a salt-saturated mud system to save cement when cementing the oil string later.

Rock properties.—General characteristics of the Soraberry pay horizons as determined from core analyses include permeability of 0.002 to 2.5 md., 16 to 18 per cent porosity, 25 to 45 per cent connate water, and 15 to 25 per cent residual oil. This data is for what is termed a clean sand, and is determined from a retort-type analysis of the matrix rock with no consideration given the fractures. Cores usually show, it was stated, evidence of a solid hydrocarbon in the matrix that will not fluoresce and will not be cut by carbon tetrachloride, a common petroleum solvent.

Based on core data alone, and based on 45 ft. of net pay, it was stated that a well in the Spraberry without fracturing would produce a maximum of 5 to 10 bbl. per day with all physical characteristics of the formation assumed to be high or at maximum figures.

Connate water content of cores was said to increase in wells toward the south portion of the Spraberry trend area.

Fluid data.—Most of the data about produced crude from widely spaced areas in the trend show reasonable agreement. Reservoir temperatures are about 138° F., the formation volume factor is about 1.4 bbl. of reservoir oil per barrel of stock-tank oil, solution gas-oil ratio is about 725 cu. ft. per bbl. of reservoir oil, and the gravity averages about 36.5° A.P.I.

The reservoir.—Statements regarding characteristics of the reservoir were in general agreement. Most of the oil in the reservoir is in the matrix rock, with a minor percentage—perhaps on the order of 1 per cent—in fractures. But estimates show that this is about reversed in the case of permeability, with about 95 per cent of the passages into the well bore being in fractures.

Preliminary calculations on flow rates and measurement of cores would indicate that the average fracture width in the Spraberry productive horizons are on the order of five-one-thousandths to one-one-hundredth centimeters.

The reservoir engineers felt that it was desirable to maintain liquid saturation in the fractures and to maintain high differential pressures between the fracture faces and the matrix rock in order to achieve the highest recovery from the rock.

Low efficiency.—Reservoir performance was said to be of low efficiency with low productivity rates per pound of pressure differential between static and flowing conditions. Long buildup in time for reservoir pressure after drawdown was said to indicate that production is coming to a large extent from the matrix rock where travel of fluids through the low permeability is slow.

Because of these characteristics, it was said that conventional methods of secondary recovery by gas injection or by water injection would be unsuccessful, since gas must be removed from the well as soon as produced to maintain the high differential pressures in the well.

Completion methods.—Old and new methods of drilling the last few feet of hole into the Spraberry pay were given considerable discussion. The most common completion practice consists of setting the oil string of casing at or near the top of the pay and drilling into the pay with a reverse-circulation rotary rig or with cable tools.

It was brought out, however, that some operators are setting casing through the pay and completing through perforations in the casing with apparently good results.

The second Spraberry well is being drilled with air as a circulating medium instead of a liquid such as mud or oil. These two wells do not offer conclusive evidence as to the merits of the completion technique but show promise that investigation is to continue.

Two methods of artificially increasing permeability, either by creating new fractures or enlarging old ones were described. Hydrafracing has been discussed before in The Oil and Gas Journal, and is a widely used technique in Spraberry fields. A new method that has just been introduced uses a similar process called Stratafrac, injecting an acid-kerosine gel into the bore hole under high enough pressures to crack the rock or widen old fractures and then prop them open.

Plant Dedicated

Huge cooperative venture undergoing process tests

SNYDER, Tex.—Snyder gasoline plant, a huge natural-gas conservation project owned by 30 companies and 60 individuals, was officially dedicated this week.

The cooperative venture, considered by some to be the largest plant in the world as measured by the total liquid hydrocarbons produced from casing-head gas, will produce approximately 500,000 gal. of liquid products per day from 65,000,000 cu. ft. of gas when operating at peak capacity.

More than 473,000 gal. was produced in 24 hours from 50,000,000 cu. ft. of gas earlier in the week, although the plant is still undergoing processing tests.

Sunray Oil Corp., plant operator, was host October 24 at an open house featuring an address by Olin Culberson, chairman of the Texas Railroad Commission. Texas' Gov. Allan Shivers also attended.

Large area served.—The new $8,000,000 plant serves an area of approximately 34,000 productive acres in Kelly-Snyder field. It is connected to about 860 oil wells producing mostly from the prolific Canyon Reef.

Engineers now working on recommendations for a Scurry repressuring project hope production can be approximately doubled by unitization and if pressure maintenance is instituted.

EFFECTS OF CORROSION.—Miscellaneous equipment taken from installations in McElroy field show the effect of corrosion on rods, tubing, mud anchors, and pump tubes. Some of the tubular goods has been corroded all the way through the pipe wall.

N.A.C.E. Tour

Inspection of installations in Permian basin held to check on many corrosion-resisting materials, methods

Roy F. Carlson

ODESSA, Tex.—Maintenance of well and storage equipment in sour-crude and salt-water-producing areas is a constant, expensive, and difficult problem. There are a multitude of coating materials, inhibitors, and procedures being used to halt or minimize corrosion, with varying degrees of success, but probably none of these represents the ultimate answer from an economic and practical standpoint.

The annual corrosion tour sponsored by the Permian Basin Chapter of the National Association of Corrosion Engineers included visits to oil-production and storage installations throughout West Texas and Southeast New Mexico recently to check on the progress of many kinds of corrosion-resisting methods and materials. Scale deposition, allied with corrosion against oil producers, was also studied in storage and producing equipment in the area.

Tank protection.—In most well-production storage equipment such as tanks, the commonest method of protection against corrosion is a coating of the surfaces of the vessel where they are exposed to produced liquids and vapors. Commonly this coating is a plastic, painted or sprayed on the entire interior of the tank so that metal in the tanks is kept from being in contact with the corrosive fluids. The plastics or other types of materials are largely unaffected by corrosion. The apparent problem in using this kind of material is that the coating is only as good as the application—unless the applicator is extremely careful in cleaning and coating the tank wall the coating will be penetrated in spots and the entire coating may be removed from the tank wall.

Other methods of fighting corrosion in storage equipment is the use of galvanized tankage. The galvanizing process coats the tank walls with a corrosion-resistant material which is effective in some instances if the coating is unbroken.

Aluminum decks — roofs of the tanks—are installed in several areas in the Permian basin, and these seem to be unaffected by corrosive substances. The deck of a tank is normally affected to a larger extent than some other parts of tanks because of concentration of corrosive gases in the vapor space just under the deck, and because of condensation of water vapors which with dissolved gases does the corroding. Another critical portion of the tank is the bottom and lower portion of the sides. This area is exposed to any produced water and any condensed water falling from the tank deck, along with dissolved corrosive gases.

Some special treatments have been devised for tank bottoms. One such treatment has the bottom and 18 in. of the side nickel-plated. This plating has resisted corrosion very effectively in an area where it has been particularly severe.

Pipe lines affected.—Pipe lines, too, particularly those carrying corrosive gases and water, are rapidly affected by corrosion. Coating of the pipe wall is being tried in this instance, too, to reduce corrosion. Plastics are widely used for internal coating of line pipe, as is cement. The cement linings are applied joint by joint and are put in place centrifugally, making a defense fine-grained, hard coating on internal surfaces of the pipe. Plastic coatings are either applied in shops or are applied by various methods in the line in place in the ground.

Down-the-hole corrosion also presents a considerable problem to production people. Pumps and pump valves, rods and tubing, and casing are all affected by corrosive materials. Sucker rods corrode rapidly, and cause expensive fishing jobs for a parted rod string and a dropped pump. Corrosion of this nature is combated by use of inhibitors or by plastic coating of the rods to prevent contact with corroding gases and liquids. Tubing is also sometimes internally coated to reduce corrosion, as is casing.

Casing. — Corroded, leaking casing poses a particularly troublesome problem, and one that is expensive to solve. This kind of corrosion often takes place on the outside of the pipe, and necessitates removing part of the casing string from the well, and replacing it. The most effective means of protecting the casing seems to be packing off the exposed side of the pipe from corrosive elements by using sweet crude or other noncorroding materials.

Corrosion Aids

N.A.C.E. hears of ways to hold problem to a minimum

Walter Rose

CORPUS CHRISTI. — The weight loss of corroded metal is not nearly so important as where the problem occurs and what the corrosion mechanism is, members of the National Association of Corrosion Engineers were told here.

Speaking before the South-Central regional meeting of N.A.C.E. held October 18-20, W. B. Brooks, of Dow Chemical Co., Freeport, Tex., said that if corrosion was uniformly distributed over all the exposed metal surfaces, such corrosion, in general, could continue for years without causing trouble. Thus it is the fact that corrosion usually occurs in localized areas because of localized environmental conditions that are responsible for premature failure of corroded metal parts.

Brooks brought this fact out while discussing the corrosion problems confronted by his company in the processing of sea water for extraction of magnesium and bromide.

Approximately 300 were in attendance at the meeting to hear discussions by 12 authors on the best ways to minimize the dollar loss to industry occuring each year due to corrosion, estimated by H. H. Anderson, Shell Pipe Line Corp., vice president and general manager, Houston, at $5,500,000,000 annually.

Although the corrosion problem is a major one in all industries, the group gave particular attention to discussions on how best to prevent corrosion in the producing, transportation, refining and petrochemical branches of the petroleum industry.

Pipe-removal method. — Hugh Wilbanks, Jr., city gas engineer for Corpus Christi, described a novel scheme to remove pipe under road beds for reuse. This method avoids the necessity of digging the pipe out and involves heating with open flame at an exposed end until the tar coating softens. Pipe is then easily pulled out of the ground with a winch.

Almont Ellis, of Interstate Oil Pipe Line Co., Shreveport, discussed use of aluminum pipe for the transportation of sour crude and for moving noncorrosive fluids in the Gulf Coast area where external corrosion is a problem. He said that the sour-crude application was generally unsuccessful, because iron sulfide deposition from upstream corrosion resulted in establishment of galvanic cells in the pipe.

In gas-condensate wells where continuous injection of an inhibitor through the annulus is not possible, intermittent injection of sodium carbonate provides some control, according to Charles G. Nathan, The Texas Co., Houston. He said, however, that the success of intermittent injections depends much on the rate at which the gas-condensate is produced after the well is opened.

GULF COAST

Taming Heat Exchangers

They will behave if properly designed and fabricated the way designs specify, Galveston A.I.Ch.E. group told

F. Lawrence Resen

GALVESTON. — Heat exchangers will behave in accordance with desired performance specifications if they are designed with the proper mechanism and theory as a basis, and if they are fabricated in the manner that the design calls for, the South Texas Section, American Institute of Chemical Engineers, was told here last week.

C. H. Gilmour, staff engineer for Carbide & Carbon Chemicals Co., South Charleston, W. Va., in a paper on "How to Make Heat Exchangers Behave," said that special care must be taken to see that the flow through the tubes is fairly uniform and that there is a minimum of leakage on the shell side.

"A uniform procedure for design should be used in order to obtain consistent results," he said. " By combining all expressions which apply to heat-transfer specifications into one expression, the design equation boils down into a simple formula containing four significant factors," Gilmour reported.

Gilmour presented a computation sheet which was constructed by this method. Although it eliminated reference to heat-transfer coefficients, he said, nevertheless the effect of all variables in heat-exchanger design are indicated.

The author said that by using this method of design with a "reasonable amount of judgment," the task of heat-exchanger design "becomes a simple routine procedure and the accuracy is all that can be desired."

The computation sheet has additional utility in that the data obtained from existing exchangers may be recorded, and an unknown quantity such as fluid viscosity or fouling factor may be obtained by operating the system in reverse, Gilmour stated.

Air-cooling.—Dr. W. W. Akers, of Rice Institute, continued the discussion of heat exchangers, but in this instance he concentrated on the use of air-cooled exchangers. In presenting their advantages over conventional water-cooling towers, he listed the elimination of having a water supply, water-treating facilities, and the necessary water-cooling equipment. He also brought forth the small space required for air-cooled exchangers, indicating that they could be fitted into any section of the plant, even within a process area where the operator would have close control over them. Their use where temperatures have to be dropped close to that of the ambient air are somewhat limited according to his discussion.

Gasoline source. — In presenting a paper on "Fluid Hydroforming," Henry G. McGrath, M. W. Kellogg Co., Jersey City, broke down the sources of gasoline on a percentage basis according to 1950 refinery runs. Eight per cent came from natural gasoline and 25 per cent from catalytic cracking. The remaining 67 per cent, divided almost equally between thermally cracked and straightrun stock, lends itself to be used in naphtha upgrading, he said. Fluid hydroforming, developed by Kellogg, uses a fluid-particle size catalyst, which can be replenished whenever the catalyst activity should decline. Three units are now under construction, the largest being one for Cities Service Refining Corp. at Lake Charles which is expected to handle 30,000 bbl. of naphtha per day he said.

Catalytic reforming.—A similar paper was given by Joseph William Schall, Houdry Process Corp., Marcus Hook, Pa., wherein he described his company's houdriforming process applicable to the production of aromatic concentrate and high-octane gasoline. Pilot-plant data was gathered for the processing of pure compounds and also for typical charge stocks. An interesting feature brought out was the large production of high-purity hydrogen as a byproduct. As a result of dehydrogenation taking place in the production of benzene, toluene and xylene, approximately 1,300 cu. ft. per barrel of 98 per cent hydrogen was produced. The thought was put forth that an operator could possibly wish to produce hydrogen with this process and use the aromatics as byproducts.

Cooling code.—The new code for cooling equipment which the American Society of Mechanical Engineers is developing was described by Dr. Joseph Lichtenstein, Foster Wheeler Corp., New York. Purpose of the new code is to supersede the present one which is obsolete, and also to insure against its own obsolescense in years to come. Biggest difficulty in establishing the code is the variation of ambient wet-bulb temperatures. With such a variant, it is difficult to evaluate the equipment and insure that it is performing in accordance with manufacturer's guarantee.

Big Cat on Stream

Gulf Oil's Port Arthur capacity now 275,000 bbl.

PORT ARTHUR, Tex.—Charles R. Stevenson, long-time Gulf Oil Corp. employe, turned a valve here this week that sent charge stock roaring into the reactor tower of the world's biggest fluid catalytic cracking unit.

The huge 63,000-bbl. cracker, with a throughput approximately 20 per cent greater than that of any such unit now in operation, went on stream officially in a brief ceremony attended by 150 civic leaders and industrialists in the Southwest.

Built by M. W. Kellogg Co., New York, the unit was completed in about a year after ground was broken. It

covers 148,400 sq. ft. and stands as high as a 22-story building.

Capacity enlarged. — The new cat, along with other new and realigned equipment, has increased refinery capacity 30,000 bbl. to 275,000 bbl. per day to rank the plant with the largest installations in the world.

Supplemental equipment installed includes two 30,000 lb. per hour boilers, a water-cooling tower, and a copper-sweetening unit. Other existing plant equipment was realigned to bring the refinery into balance with the cracker.

The cat will produce ingredients for aviation gasoline, materials for synthetic-rubber production, high-quality auto gasolines, and home-heating oils.

More expansion.—Gulf President Sidney A. Swensrud outlined plans for construction of a 60-ton per day sulfur-recovery unit in his address during the ceremony. The unit will utilize hydrogen sulfide from refinery waste gases as feed for extraction. It will be built by Ralph M. Parsons Co., Los Angeles. Swensrud said the plant would use the sulfur in producing enough sulfuric acid to make 360,000 gal. per day of alkylate.

Other units being added to the Port Arthur plant include facilities for production of 9,000,000 lb. of isooctyl alcohol per year and an ethylene plant roughly estimated to have a capacity of 220,000,000 lb. of ethylene per year.

ECONOMICS

Octane Cut Only Slight

Reduction in numbers small for both premium, regular gasolines during third quarter, Du Pont survey shows

REDUCTIONS in octane numbers of both premium and regular gasolines during the third quarter were very slight, according to a survey of the petroleum-chemical division of E. I. du Pont de Nemours & Co., Inc.

COMPARISON OF MOTOR-GASOLINE SURVEYS
(Octane numbers are by research method; arithmetic averages by cities)

	Premium				Regular			
	Oct. No.			TEL content	Oct. No.			TEL content
	Oct. 1950	July 1951	Oct. 1951	cc./gal. Oct. 1951	Oct. 1950	July 1951	Oct. 1951	cc./gal. Oct. 1951
Aberdeen	88.9	89.1	88.4	2.46	82.4	81.7	81.4	1.63
Amarillo	88.4	88.0	87.5	1.70	79.9	80.0	80.3	2.22
Atlanta	92.2	91.2	91.3	1.53	85.9	84.5	84.1	1.74
Bakersfield	89.2	89.1	89.3	2.53	81.1	80.2	79.9	1.39
Baltimore	92.8	92.4	92.5	1.36	86.7	86.1	85.6	1.68
Boston	92.7	92.0	91.8	1.63	87.3	86.1	86.0	1.36
Calgary	84.6	84.4	84.5	2.06	78.8	78.9	78.5	1.54
Casper	88.8	88.2	88.2	1.38	82.0	81.0	80.6	0.88
Charlotte	91.9	91.8	91.6	1.72	85.3	84.9	84.6	1.71
Chicago	89.4	89.4	88.8	1.62	83.1	82.6	82.0	1.49
Cincinnati	90.4	90.9	90.8	2.38	85.7	84.6	85.2	1.78
Cleveland	91.0	90.6	90.8	1.85	86.5	85.8	85.2	1.18
Columbus	91.5	90.6	90.7	2.20	86.3	85.0	85.3	1.68
Corpus Christi	92.0	91.5	91.0	1.72	84.6	84.4	83.5	1.45
Dallas—Fort Worth	91.7	91.1	91.3	2.34	84.2	83.5	84.1	2.66
Denver	89.2	88.3	88.2	1.40	81.3	80.0	80.6	1.17
Detroit	90.5	90.8	90.6	2.19	86.0	84.7	84.7	1.67
El Paso	86.2	85.2	85.7	2.44	79.7	77.6	77.2	2.30
Great Falls	89.7	89.9	90.0	2.44	81.5	81.9	81.3	2.31
Houston	92.6	91.6	91.4	2.25	85.6	84.4	84.4	2.21
Indianapolis	88.8	89.6	89.4	1.92	84.2	82.4	83.0	1.64
Jacksonville	91.5	91.2	91.0	1.83	86.2	85.7	84.9	1.81
Kansas City	90.1	88.7	88.5	1.53	82.9	82.2	82.1	1.36
Little Rock	90.6	90.8	90.5	2.19	84.5	83.5	84.0	2.01
Los Angeles	90.7	89.7	89.9	2.07	83.0	81.1	81.4	1.53
Louisville	91.3	90.0	90.1	2.43	84.8	83.9	83.5	2.18
Memphis	90.7	90.2	90.5	1.99	84.9	83.4	83.3	1.73
Milwaukee	89.2	89.8	89.3	2.14	83.1	83.0	82.4	1.74
Minneapolis	89.8	88.8	89.3	2.04	82.3	81.7	81.9	1.64
Montreal	88.8	89.6	89.5	1.56	85.0	85.0	84.7	1.18
Nashville	91.3	89.7	90.0	2.24	84.6	83.4	83.9	1.95
New Orleans	91.6	90.2	90.5	1.93	84.9	83.4	84.0	1.76
New York (Metropol. area)	92.4	91.8	91.7	1.74	86.1	86.2	85.8	1.44
Omaha	89.7	88.4	88.6	1.83	82.3	81.8	81.7	1.14
Philadelphia	92.5	92.0	91.1	1.47	86.5	85.8	86.1	1.40
Pittsburgh	91.8	91.5	91.6	1.90	86.2	85.7	85.8	1.81
St. Louis	90.1	88.8	88.8	1.85	83.6	81.9	82.4	1.48
Salt Lake City	87.8	87.9	88.4	1.38	79.5	79.4	78.2	0.75
San Francisco	91.5	90.1	90.2	2.19	82.9	80.9	81.2	0.99
Seattle	90.9	90.1	89.5	1.68	82.6	81.1	80.8	1.06
Shreveport	90.3	90.5	90.1	2.42	84.3	84.0	83.7	1.97
Spokane	90.8	89.5	89.4	1.52	82.0	82.0	81.2	1.21
Toronto	88.8	89.4	89.4	1.68	84.3	85.1	85.1	1.23
Tulsa	89.8	89.1	88.9	1.97	82.4	82.0	82.0	1.65
Vancouver	..	89.0	88.3	2.88	..	83.1	83.2	1.98
Wichita	87.8	87.8	86.8	2.52	81.5	81.1	80.4	2.00
Winnipeg	..	87.8	87.8	1.42	..	83.2	83.0	1.29

The unweighted arithmetic average of premium octane numbers for the 45 cities, which are covered in both current and last year's report, is 89.7 compared with 89.8 at the first of July and 90.3 at the first of October 1950. Thus, the average research octane number for premium-grade gasoline has dropped only 0.6 in the past year.

For the same cities, the TEL content for premium averaged 1.94 cc. per gallon compared with 1.98 cc. in the July survey and 2.39 cc. for October a year ago. The average TEL content was increased in 20 cities compared with the July survey while the average octane number was up for only 17 cities.

Regular gasoline in all 45 cities had an average octane number of 82.8 compared with 83.0 in July and 83.7 in October 1950. Since July, the average octane number was decreased for each of 26 cities, increased for 15, and was unchanged for 4.

TEL content.—Current TEL content averaged 1.59 cc. per gallon, a drop of .04 cc. since July. In the past year TEL content for regular has decreased .50 cc. compared with a slightly smaller drop of .45 cc. for premium.

GENERAL COMPARISONS*

	Oct. 1950	July 1951	Oct. 1951
Premium:			
Research octane No.	90.3	89.8	89.7
TEL content (cc. per gallon)	2.39	1.98	1.94
Regular:			
Research octane No.	83.7	83.0	82.8
TEL content (cc. per gallon)	2.09	1.63	1.59

*Unweighted averages of figures for 45 cities.

Postwar Record Set

Oil exports up 11.5 per cent; imports show loss

EXPORTS of crude and products, excluding shipments to territories, averaged 523,000 bbl. daily for August to set a new postwar record, according to data released by the Department of Commerce.

The August total represents an increase of 11.5 per cent over July and 109.2 per cent over August 1950. Exports in June of this year, before the total was boosted by shipments to foreign areas normally supplied from Abadan, averaged about 372,000 bbl. daily. Most of the gain since that time has been due to the Iranian shutdown.

Increases over July were reported for all major products except residual fuel. Distillate fuel was up about 30,000 bbl. daily. Gasoline and kerosine each increased about 13,000 bbl. daily. Shipments of residual fuel were off about 6,000 bbl. daily from July, and average for lube oils decreased 3,000 bbl. daily.

Imports.—Imports for the month were

745,000 bbl. daily, the lowest point since February 1950. August totals represented a decrease of 8 per cent from July and 12 per cent from August 1950.

The first delivery of Canadian crude was reported in August, a total of 46,456 bbl. Receipts from all other areas were less than in July. Greatest drop was reported for Venezuela, down 581,000 bbl. for the month.

IMPORTS INTO CONTINENTAL UNITED STATES

(Thousands of barrels)

	Aug. 1951	July 1951	Aug. 1950
Crude—			
Mexico	1,187	1,210	1,032
Colombia	1,218	1,276	1,344
Venezuela	8,767	9,348	10,207
Kuwait	2,276	2,827	1,949
Saudi Arabia	1,482	2,404	1,156
Borneo	319	327	....
Canada	46	....	....
Trinidad	....	220	....
Total crude	15,297	17,612	15,688
Daily average	494	568	506
Products—			
Residual fuel	3,005	3,179	1,221
Other products	427	829	1,371
Total products	7,786	7,501	10,622
Daily average	251	242	343
Total all oils	23,083	25,113	26,310
Daily average	745	810	849

EXPORTS*

(Thousands of barrels)

	Aug. 1951	July 1951	Aug. 1950
Crude	2,361	2,320	3,096
Gasoline	4,093	3,676	982
Kerosine	1,000	591	60
Distillate fuel	3,186	2,257	806
Residual fuel	3,005	3,179	2,221
Lube oils	1,520	1,618	1,101
Other products	1,052	905	479
Total all oils	16,217	14,546	7,745
Daily average	523	469	250

*Excludes exports to territories.

NATIONAL AFFAIRS

Avgas Stocks Fall

High military demands bring forth PAD orders reserving alkylate, slapping floor on TEL use in civilian product

Bertram F. Linz

WASHINGTON.—The Petroleum Administration for Defense has issued two drastic new orders aimed at boosting high-octane aviation-gasoline production by 15,000 bbl. per day as a result of a sudden sharp drain on supplies.

All alkylate and alkylate raw materials have been reserved for the exclusive manufacture of high-octane aviation gasoline. In addition, PAD slapped a floor on the amount of tetraethyl lead that must be used in civilian avgas.

At the same time, the Armed Services Petroleum Purchasing Agency offered lossproof contracts to refiners for rehabilitation or construction of facilities to produce more alkylate.

Under PAD Order No. 3, the use of alkylate, hydrocodimer, and diisopropyl in anything but aviation gasoline is prohibited, and refiners are required to use available raw materials for production of alkylate to insure maximum production.

PAD Order No. 4 requires refiners to use not less than 4 cc. of TEL in each gallon of civilian domestic-aviation gasoline of the higher grades and not less than 4.6 cc. in each gallon of the higher grades of aviation gasoline for export. Exceptions will be granted for some large commercial aircraft that must use Grade 108/135.

The increase in the use of TEL for aviation gasoline will amount to only about 1 per cent of the present supply of the fluid, it was estimated.

Tables turned.—The need for additional aviation-gasoline supplies came at a time when PAD was confident it had its problem licked and had overcome the loss of 18,000 bbl. daily from Iran.

However, early this month the Navy came up with a sharp increase in its requirements. This was followed by an Air Force request for another increase. The result was that the indicated supply fell short about 24,000 bbl. daily.

It is estimated that as a result of the two orders the deficiency will be cut to 10,000 bbl. daily, but PAD officials are adopting a wait-and-see attitude. They believe there is sufficient elasticity in the industry to make up that amount and pointed out that the industry has overcome similar deficiencies, and, since the 10,000 bbl. is only about 5 per cent of the total requirement, refinery operations may take up the slack.

No more increases.—Issuance of the orders and the expectation that no further increases in requirements will come over the next few months has led officials to believe the aviation-gasoline situation will be in balance the rest of this year.

Military demands are expected to go up next year, but by then new aviation-gasoline facilities will be coming into operation. However, Deputy Administrator Bruce K. Brown said projected expansion in the military-aircraft program will make for an even more acute shortage sometime next year.

"Through the regulation of alkylate use and restrictions on the use of such feed stocks as isobutane, butylene, and propylene," Brown said, "we expect to obtain a significant increase in aviation-gasoline output. By increasing required TEL use in civilian-aviation gasoline, we expect to obtain immediately a further increase in aviation-gasoline supplies."

Order 3 Clarified

Question-answer forum explains alkylate order

WASHINGTON.—Petroleum Administration for Defense has set out, in question-and-answer form, an explanation of its Order No. 3 relative to alkylate and TEL controls. The order itself, PAD stated, is not completely self-explanatory because of legal limitations on what can be incorporated in such orders.

Following is the complete question-and-answer symposium:

TERMS USED IN THE ORDER

Q. Who is a "refiner" under the order?

A. A refiner is anybody who is engaged in any operation directly incident to the processing, reprocessing, or alteration of petroleum, including the extracting or recovery of natural gasoline. (Includes operators of natural-gasoline plants.)

Q. What does "blending agent" mean?

A. Blending agent means alkylate, hydrocodimer, or diisopropyl. An "aviation-quality blending agent" is a blending agent having physical and chemical characteristics as to make it suitable for inclusion directly in a fuel for the operation of reciprocating engines for aircraft.

Q. What does "feed stock" mean?

A. Feed stock means isobutane, butylene, propylene, pentylene, or polymer, or any combination of these, which is of a quality suitable for use in the manufacture of alkylate, hydrocodimer, or diisopropyl.

Q. When the order speaks of "manufacture," does it include such operations as blending and compounding?

A. Yes. Manufacture is defined in the order as including processing, producing, altering, extracting, recovering, compounding, blending, or the like.

MANUFACTURERS OF FINISHED AVIATION GASOLINE

Q. If I am currently using any alkylate in the manufacture of a fuel other than finished aviation gasoline, must I stop doing so?

A. Yes, unless an exception is obtained from PAD.

Q. Does this order have anything to do with the use of aromatics, catalytic base stocks, isopentane, or any other components, except blending agents, that are normally used in blending finished aviation gasoline?

A. No, except to the extent that the refiner can, with reasonable diligence, use any of such available materials to maximize his production of any grade or grades of finished aviation gasoline.

Q. If I am currently polymerizing any feed stocks and the polymer is not going to the manufacture of blending agents and I have available alkylation capacity, must I reduce the polymerization operation to the extent necessary to fill up my alkylation capacity?

A. Yes, if you are not relieved of that obligation under any of paragraphs b, c, d, or e of Section 4 or have not obtained an exception from PAD.

Q. If I have facilities and feed stocks capable of producing more blending agents than I can use in the manufacture of

finished aviation gasoline because of limited blending facilities or lack of other necessary blending components at that location, what am I to do?

A. Notify PAD of the quantity, quality, and location of additional blending agents that you can produce and request relief from the provisions by which you are affected until arrangements can be made for the proper use of such blending agents.

Q. If I have no purchaser for the finished gasoline that I can manufacture, what am I to do?

A. Notify PAD of the quantity and grades of aviation gasoline that can be produced and request relief. PAD will either arrange for a purchaser for the gasoline or grant exceptions from the provisions by which you are affected until a purchaser is provided.

Q. If my aviation-gasoline product storage is full, and no facility for taking delivery has been provided by my purchaser, what am I supposed to do about the alkylate that I normally blend into the aviation gasoline?

A. Notice of such a situation and a request for relief should be submitted to PAD as many days as possible before storage facilities will be full. You should continue to accumulate receipts or production of alkylate in intermediate storage until full. Then you should request PAD to grant an exception from Section 3(a) until delivery is taken by your purchaser.

MANUFACTURERS OF ALKYLATE

Q. Am I required to manufacture aviation gasoline from the alkylate I produce?

A. No, but if you do not manufacture aviation gasoline, you may not make any other use except to sell the alkylate to another refiner who will manufacture finished aviation gasoline from it, unless you have obtained an exception from PAD. However, any refiner who produces alkylate presumably will find it to his economic advantage to manufacture finished aviation gasoline from his alkylate production.

Q. What responsibility do I have to make sure that the recipient of any blending agent delivered by me will use such blending agent in accordance with Section 3?

A. You should require the recipient to advise you in writing that such is his intended use. If the delivery is made on written instructions from PAD, you would not be expected to obtain any written assurance of the proper use of the blending agent.

Q. What is the responsibility of a refiner who is currently making alkylate that is unsuitable for aviation gasoline and who has no means of making the alkylate suitable for such purpose?

A. He should request an exception from Section 3(b) from PAD until such time as the blending agent can either be made into an aviation-quality blending agent or be delivered to another refiner or manufacturing location with capacity for finishing the blending agent.

Q. If I am operating my alkylation facilities at full capacity but have surplus alkylation feed stocks, may I continue using such surplus feed stocks as I have in the past?

A. Yes, until such time as PAD issues written instructions to deliver such surplus feed stocks to another refiner or manufacturing location.

Q. I have spare alkylation capacity and surplus feed stocks, but they are at different refinery locations. What am I required to do about this situation under Section 4?

A. Nothing, until such time as PAD instructs you to deliver the feed stocks to another refiner or manufacturing location.

Q. If I am manufacturing a blending agent but do not possess facilities at the same location having capacity available to product a blending agent of aviation quality, must I continue to produce a blending agent from my feed stocks?

A. No, but if you discontinue the operation, you may not make any other use of such feed stocks except to sell them to another refiner for use in the manufacture of a blending agent, unless an exception has been granted by PAD. However, the refiner presumably will find it to his economic advantage to continue the operation and either provide facilities required for finishing his blending agent to aviation quality or sell the blending agent to another refiner who will manufacture an aviation-quality blending agent.

Q. Assuming the same conditions as in the above question, may I use such blending agent in motor gasoline?

A. No, unless an exception is granted by PAD.

Q. If I possess additional facilities which can be rehabilitated or otherwise adapted for the manufacture of a blending agent and I have available feed stocks, how am I affected by this order?

A. The order does not require you to rehabilitate or otherwise adapt such facilities for blending-agent manufacture. You are not affected by the order unless you receive instructions from PAD to deliver such feed stocks to another refiner or manufacturing location.

MISCELLANEOUS

Q. I am a producer of virgin naphtha that may be suitable for aviation-gasoline blending. Am I affected by PAD Order No. 3?

A. No, if you do not produce finished aviation gasoline.

Q. I do not have an alkylation or hydrocodimer plant, nor do I blend aviation gasoline. What am I required to do by this order?

A. Nothing. But if you have a feed stock suitable for the manufacture of a blending agent, you may be instructed by PAD to deliver such material to another refiner for manufacture of a blending agent.

Q. I operate a natural-gasoline plant and produce isobutane. Am I required by this order to take any action?

A. No. You are immediately affected by the order if you do not have facilities for the manufacture of a blending agent at the same location. However, you may be instructed by PAD to deliver the isobutane to another refiner for manufacture of a blending agent.

Q. I operate a natural-gasoline plant and either produce or have the facilities for producing isopentane suitable for use as a vapor-pressure corrector in aviation gasoline. Am I affected by this order?

A. No, unless you manufacture finished aviation gasoline at the same location.

Q. I have a cracking unit that produces olefins and isobutanes but do not have facilities at the same location for the manufacture of a blending agent. How am I affected by this order?

A. You are not affected unless the olefins and isobutanes as normally recovered by you are suitable for manufacture of a blending agent. Even then no action is required of you unless PAD instructs you to deliver the material to a manufacturer of a blending agent.

Q. Does this order require production of aviation base stock with cracking facilities which are currently being used in the manufacture of motor gasoline?

A. No.

Q. At certain times I make small quantities of Grade 91/98 aviation gasoline, but no blending agent is used in the manufacture. How am I affected by this order?

A. You are not affected by this order with respect to the manufacture of finished aviation gasoline unless blending agents are used in one or more of the grades being manufactured. If blending agents are used you must use reasonable diligence to make maximum quantities of aviation gasoline.

New Avgas Plants Planned

WASHINGTON. — Certificates of accelerated amortization have been granted by the Defense Production Administration for new aviation-gasoline facilities to be built by two oil companies at a cost of nearly $21,000,000.

The largest project calls for an investment of $16,120,000 by Sunray Oil Corp. at Corpus Christi, for which DPA issued certificates for 100 per cent of $1,775,000, 75 per cent of $10,325,000, 55 per cent of $3,645,000, and 15 per cent of $300,000, leaving $75,000 uncovered.

The other project calls for an investment of $5,680,000 by Frontier Oil Refining Corp. in Erie County, New York, for which certificates were issued for 100 per cent of $800,000, 75 per cent of $3,125,000, and 50 per cent of $1,405,000, leaving $260,000 uncovered.

On other projects proposed during the past year, DPA granted certificates for quick write-off of 75 per cent of a $400,000 investment to be made by Aurora Gasoline Co. for butylene production at Detroit; 80 per cent of a $75,093 oil barge to be built by Alabama Transit Co. for use on the inland waterways; and 60 per cent of a $787,863 investment by the A. O. Smith Corp. for line-pipe production at Milwaukee.

More Avgas Needed

DPA ranks it eighth in list of vital programs

WASHINGTON.—Expansion of aviation-gasoline production has been ranked eighth by the Defense Production Administration in a list of 10 most vital construction programs which will be given first priority in the issuance of certificates of necessity for accelerated tax amortization.

Preparing to resume the issuance of certificates after the 60-day suspension which went into effect August 18, DPA last week laid down new rules designed to channel available materials to most-needed industrial construction.

Rules change.—With this in view, it announced that, effective next month, applications for certificates must be approved before construction is started. Heretofore, the regulations permitted the filing of applications at any time within 6 months after the beginning of construction.

This rule was required, it was explained by Defense Production Administrator Manly Fleischmann, because "since essential expansion programs are making increasingly heavy demands on available scarce and critical materials and it does not appear that this situation will improve in the next several months, there should be a much greater control of expansions proposed for certification to keep them within established goals.

"When an applicant files for a certificate after the beginning of construction, it is patently impossible for DPA to give full consideration to established policies such as those relating to dispersion and manpower and the further concentration of economic power," Fleischmann said.

Review not complete.—Although the

moratorium of August 18 was ordered so that DPA could review the situation, Fleischmann said that the review had not been completed and a study would be made of the more than 500 cases still pending in the agency, which have been represented as "urgent."

At the same time, all applicants with requests on file will be canvassed to ascertain whether they have commenced construction or propose to do so, and whether the necessary materials have been requested. It is anticipated that many applicants may have abandoned proposed expansion because of lack of funds or materials or for other reasons.

In the future, issuance of certificates will be based on the extent of the particular shortage involved and the degree to which already certified expansion has reduced it.

Preference list.—For this purpose, DPA has set up a preference list based on the degree of essentiality, in the following order: (1) Machine tools, cutting tools, dies, gages, jigs, and fixtures; (2) copper, lead, zinc, and similar ores; (3) pig iron; (4) sulfur; (5) military end items and supporting products urgently needed by the armed services; (6) basic aluminum; (7) nitrogen; (8) aviation gasoline; (9) steel scrap; and (10) special aluminum extrusions.

Certificates will not be issued for projects commenced after November 1 unless, prior to the beginning of construction, the administrator makes a determination as to shortage of facilities and essentiality of the product.

Alkylate Stepup

ASPPA seeks higher output to satisfy military needs

WASHINGTON.—The Armed Services Petroleum Purchasing Agency is asking for proposals from refiners covering the rehabilitation of alkylation plants or the construction of new alkylation facilities to produce for the armed services.

Loss-proof contracts are being offered as an inducement to increase output. Refiners could produce alkylate either for use by themselves as a component for aviation-engine fuel or for shipment to other refiners for blending.

The program, for which some $85,000,000 was asked of Congress, is laid out for a 5-year period, during which the rehabilitated or new facilities will either operate or be held in standby. In presenting the program to Congress, Col. W. J. Worcester, deputy executive secretary of the Munitions Board petroleum committee, told the House ways and means committee a 31,000-bbl. daily increase in alkylate production was aimed at. This would bring total output to approximately 158,000 bbl. per day, or about 50 per cent of the indicated alkylate requirements in the event of an all-out war.

Provisions outlined.—In advising refiners that proposals for expansion would be welcomed, Capt. I. N. Tripi, executive officer of ASPPA, laid down the basic provisions of agreements the agency is prepared to offer.

Refiners who will undertake to rehabilitate or construct facilities to be operated or maintained in stand-by condition for a 5-year period will be given a supply contract under which the armed services will undertake to procure aviation gasoline (or alkylate where gasoline blending components are not available) from each refiner at a price to be negotiated. Procurement will be on a semiannual or an annual basis.

The rehabilitation or construction contract will provide that if the output of the facility is not required to fill a supply contract the refiner may use its output for other purposes for a designated period. The facilities contract will provide for the armed services to reimburse the refiner for normal depreciation and maintenance costs for any period that the facilities are not used by the refiner either for government supply or for his own purposes.

Termination.—At the expiration or termination of the facilities contract the amount of the termination payment, if any, will be determined in accordance with a formula stated in the contract. Among other things, this formula will provide that consideration be given to the net value of the facilities to the contractor after the end of the contract and in determining the then net value the contractor's prospective use of the facility will be considered.

Low Score on Oil

Only a few bills affecting petroleum industry passed by Congress before adjournment; tidelands still unsettled

Bertram F. Linz

WASHINGTON.—The eighty-second Congress has wound up a 10-month session with a pleasantly low score, so far as oil legislation is concerned.

While the session was not outstanding legislatively — only around 175 new laws were added to the thousands already on the books—it undoubtedly was the nosiest on record, with something over 130 investigations to its credit.

Many of these investigations involved questionable activities of government officials and employes, others went into organized crime and communism, and a few covered the handling of the mobilization program. Oil men, however, were summoned to Washington only once or twice and no real study was undertaken of problems in the industry.

In the field of oil legislation, the big issue of tidelands was still unsettled when Congress closed the books on 1951. The so-called basing point legislation, prompted by the almost forgotten Supreme Court decision in the Cement Institute case, was passed by the Senate last August 2, and has since been immobilized in the House Judiciary Committee.

Compact extended.—A 4-year extension of the Interstate Oil Compact was approved by Congress and signed by President Truman, and the oil industry, in common with all others, will feel the impact of the new tax law which calls for higher individual and corporation taxes and increases the federal levy on gasoline to 2 cents a gallon. The industry also was covered by the new Defense Production Act, which carried a provision restricting the authority of the Petroleum Administration for Defense to curtail expansions of natural gas service.

All told, approximately 70 bills and resolutions relating to the oil industry were introduced during the session, a very small segment of the more than 10,000 measures submitted, and nearly one-third of them related to the tidelands.

Two of the measures introduced dealt with fuel policy, one by Rep. James E. VanZandt of Pennsylvania to establish a joint committee on the subject and another by Rep. John W. Heselton of Massachusetts to direct the House Interstate Commerce committee to recommend a national fuel policy. The only action, however, was approval by the Senate of extension to next January 31 of the over-all investigation started by the Interior Affairs Committee which never really got started after a 1-day "round table" session of oil, natural gas and coal representatives.

Import taxes.—Import taxes were the subject of three bills, one by Rep. Thomas A. Jenkins of Ohio to increase them and two by Reps. Hugh B. Mitchell of Washington and J. Caleb Boggs of Delaware to permit the duty-free importation of oil, other than lubricating oil and motor fuel, from Canada to the same extent that Canada permitted its duty-free importation from the United States.

Two investigations were proposed during the year, one by Sen. William Langer of North Dakota into the con-

cessions of United States companies and the other by Rep. Heselton into New England's fuel supplies.

A half-dozen bills dealt with various phases of the Mineral Leasing Act, and two others sought to protect the oil rights of homesteaders and owners of lands condemned by the government. Five bills dealt with synthetic liquid fuels, one calling for establishment of an Interior Department experiment station in Ohio and the other four aiming at establishment of commercial production.

A number of measures were introduced on the subject of natural gas, covering such matters as the right of companies to secure land by condemnation for storage and compressor facilities, divest the Interior Department of authority over pipe lines crossing government lands, and the adoption of safety rules for pipe lines.

Since the current Congress has another year to run all of these measures will remain alive for possible consideration in 1952.

Sulfur Curbs

New curtailments won't affect petroleum industry

WASHINGTON.—New restrictions on the use of sulfur will go into effect November 1, but it is not expected that the curtailments will materially affect the oil industry.

A program to be followed by the National Production Authority has been laid down by the Defense Production Administration. It is designed to eliminate the gap of 10 per cent between expected supply and estimated demand, a matter of approximate 525,000 long tons.

Orders to be issued by NPA will restrict the use of sulfur for the production of sulfuric acid or carbon bisulfide to 90 per cent of each plant's use of sulfur during 1950, but adjustments will be made for plants supplying sulfuric acid for petroleum operations and certain other essential programs.

Consumers of sulfuric acid or carbon bisulfide in a number of selected industries will be limited to 90 per cent of what they consumed in 1950, but this restriction is not to apply to petroleum.

Production estimate.—On the basis of production during the first 8 months, DPA industry experts estimate the 1951 production of native sulfur will total approximately 5,251,890 tons. This would be an increase of 60,000 tons above the 1950 output, but demand for sulfur and sulfuric acid, particularly for defense and defense-supporting programs has increased still more.

The International Materials Conference last week estimated the fourth quarter world supply of crude sulfur, outside the Communist area, at 1,467,818 tons and recommended that the allocation for the United States and Canada be set at 1,098,500 tons, an increase of 48,500 tons over the third-quarter allotment.

The United States also was given an export quota of 240,000 tons, against 250,000 tons in the third quarter, out of a total of 278,500 tons to be provided by this country, Norway, Italy, and Mexico to meet the needs of nations which must depend upon imports for all or part of their supply.

The allocation recommendations of the conference also provided 8,520 tons, against 8,500 tons last quarter, for oil refineries at Bahrein, Netherlands West Indies, Trinidad, and Indonesia. The increase for the fourth quarter, however, is more than the 20 tons indicated since no provision is made for the refinery at Abadan.

U.K. allocation cut.—Aside from the United States, the only country to use more than 100,000 tons of sulfur a quarter is the United Kingdom, for which an allocation of 102,300 tons, a cut of 4,000 tons from the third-quarter allotment, was recommended, 101,000 tons of which will have to be imported.

With the exception of Italy, given an allocation of 36,000 tons; Australia, 30,800 tons; and France, 29,600 tons, no other country consumes as much as 20,000 tons of crude sulfur quarterly, the conference report showed.

Acid Squeeze Eyed

NPA considering stiffer control of naphthenic acid

WASHINGTON.—Stiffer controls over the production and distribution of naphthenic acid are under consideration in the National Production Authority.

NPA officials discussed the matter last week with an industry advisory committee and studied recommendations designed to meet a shortage which may result from rapidly climbing military demand. Committee members present at the meeting included John R. M. Klotz, Esso Standard Oil Co., New York; C. W. Christian, General Petroleum Co., Los Angeles; H. E. Bramston-Cook, Oronite Chemical Co., New York; Dr. J. Bennett Hill, Sun Oil Co., Philadelphia, and C. A. Day, Jr., Richfield Oil Corp., Los Angeles.

Naphthenic acid is important in the manufacture of napalm fire bombs and copper naphthenate for mildew proofing, and also is used commercially in manufacturing cutting oils and lubricants, textile impregnants and emulsifying agents, and paint dryers. Military demand is rising steadily and from an estimated 51 per cent of the available supply this month will reach between 70 and 80 per cent of the supply available in the first quarter next year.

Bigger output needed.—The committee recommended that NPA ask the Petroleum Administration to develop possibilities for greater production of naphthenic acid of 180 acid number or better from all domestic petroleum producers, whether or not they are now producing it.

It was also recommended that allocation of the acid be changed from Appendix B to Appendix A of Schedule 1 to NPA Order M-45 so that NPA can acquire more information regarding end uses and inventories and make the order easier to administer.

WEST COAST

Flow Studies Aided

Radioactive tracers used to test core saturation

LOS ANGELES.—Radioactive tracers are now being employed by Union Oil Co. engineers as an improved means of determining core saturation in multiphase flow studies.

In a paper presented at the fall meeting of the American Institute of Mining and Metallurgical Engineers here October 25-26, three Union Oil engineers said excellent results have been obtained in tests using iodo^{131} benzene as an oil-phase tracer.

The authors, V. A. Josendal, B. B. Sandiford, and J. W. Wilson, all of Union's production-research department, said the tracer is insoluble in water, and tests show no evidence of sorption by any of the core materials used.

Iodobenzene was used to determine saturation profiles during capillary and dynamic desaturations and relative permeability measurements on oil-water and oil-gas systems. Other experiments compared dynamic and capillary methods of relative permeability measurements on oil-water and oil-gas systems and measured mobility of the oil phase at various saturations by displacing labeled oil with flowing inactive oil. Iodobenzene synthesis from sodium iodide was reported simple and direct.

Research also was conducted using Cesium^{134} chloride as a water-phase tracer, but complications were encountered when it was used in low-permeability cores due to sorption of cesium by the core or water-wet pads.

Faults in fluids.—Tests conducted by California Research Corp. have shown that in some instances premium-priced emulsion and oil-base drilling fluids break down when they are subjected to high temperatures and pressures.

According to F. W. Schremp and V. L. Johnson, research chemists for the company, these failures are not predicted by low temperature and pressure filter-loss tests.

World Production Gains

Upward trend in crude output resumed in August despite Iranian shutdown with daily average of 11,710,800 bbl.

Ted A. Armstrong

WORLD crude-oil production resumed its upward trend in August in spite of the fact that Iranian production dropped almost completely out of the picture.

Production throughout the world averaged 11,710,800 bbl. per day during August, a gain of 47,000 bbl. over July but still nearly 300,000 bbl. under the all-time record of 12,003,900 bbl. daily produced in June.

The increase represented a creditable performance by the world's petroleum industry, since Iran's loss had dropped more than 700,000 bbl. daily out of the world's supply. August production figures indicated that increases in other nations of the world already had made up more than 400,000 bbl. of this, and the gap was expected to be further narrowed by additional increases to be shown for September.

Production in Iran in July was 116,000 bbl. daily. Normal production operations ceased in that month, but Anglo-Iranian Oil Co., Ltd., said that additional crude runs from the fields in August averaged 9,300 bbl. daily.

The August world increase over July, in spite of this 106,700-bbl. loss in Iran, was due chiefly to stepped-up production in the United States, Kuwait, and Saudi Arabia.

Western Hemisphere.—The United States in August stepped up its output to 6,230,000 bbl., an increase of 89,000 bbl. per day compared with July. Canada also showed a gain, from 157,900 to 166,400 bbl. per day during the month. However, Venezuela and Mexico both showed decreases during the month.

For Venezuela it was the first month without a new all-time record output this year. The decline was attributed to storms in the Maracaibo area early in the month. August production in the country was 1,709,000 bbl. per day, compared with a July output of 1,717,100 bbl. daily.

Mexico's output dropped slightly, from 205,000 to 203,200 bbl. daily, but the decrease was expected to be only a temporary deviation from the country's upward trend.

Colombia showed a slight increase of 500 bbl. daily, while a slight drop of 300 bbl. was reported for Trinidad. In other Western Hemisphere countries there was no appreciable change from the July figures.

Middle East.—Kuwait and Saudi Arabia led countries in this area in stepping up producing operations in August.

Kuwait added 40,600 bbl. daily during the month, climbing from 646,000 to 686,600 bbl. per day. A further increase was expected to be shown during September. The August figure was almost double the average production of 354,000 bbl. daily dur-

WORLD CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	August 1951	July 1951	August 1950
Western Hemisphere:			
Argentina	72.5	72.5	60.0
Bolivia	1.5	1.5	1.6
Brazil	1.4	1.4	0.7
Canada	166.4	157.9	78.6
Chile	2.5	2.5	1.5
Colombia	106.9	106.4	94.7
Cuba	0.3	0.3	0.2
Ecuador	7.3	7.3	7.1
Mexico	203.2	205.0	193.5
Peru	45.3	45.3	40.0
Trinidad	57.0	57.3	56.0
Venezuela	1,709.0	1,717.1	1,563.9
Total	2,373.3	2,374.5	2,097.8
Europe and Africa:			
France	6.3	5.5	3.2
French Morocco	1.8	1.8	0.8
Germany	27.4	26.6	22.6
Italy	0.4	0.2	0.2
Netherlands	13.6	14.2	13.4
Egypt	43.5	45.8	44.5
United Kingdom	0.9	0.9	0.9
Total	93.9	95.0	85.6
Middle East:			
Bahrein	30.1	30.1	30.7
Iran	9.3	116.0	692.0
Iraq	176.6	173.9	134.2
Kuwait	686.6	646.0	354.0
Qatar	50.0	49.1	42.0
Saudi Arabia	837.8	820.1	585.8
Turkey	0.3	0.3	0.8
Total	1,790.7	1,835.5	1,839.5
Other Asia:			
British Borneo	101.0	100.0	82.0
Burma	2.0	2.0	1.8
China	2.2	2.2	2.0
India	5.0	5.0	5.2
Indonesia	150.0	150.0	145.0
Japan	7.7	7.0	6.0
New Guinea	4.9	4.8	4.8
Pakistan	3.0	3.0	3.9
Total	275.8	274.0	250.7
Total foreign less Russia and E. Europe	4,533.7	4,579.0	4,273.6
Estimated Russia and Eastern Europe:			
Austria	40.0	37.0	25.0
Romania	85.0	85.0	85.0
Russia	800.0	800.0	750.0
Other E. Europe	22.1	22.1	23.6
Total	947.1	944.1	883.6
Total foreign	5,480.8	5,523.1	5,157.2
United States	6,230.0	6,140.7	5,664.3
World total	11,710.8	11,663.8	10,821.5

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports also are lacking for certain countries of Southeast Asia. Data for earlier months have been revised where necessary.

ing the same month a year earlier.

In Saudi Arabia production continued to climb, rising from July's 820,100 bbl. daily to 837,000 bbl. Current reports set the country's September production at 847,067 bbl. daily, another increase of nearly 11,000 bbl.

Production in Iran, of course, fell to nearly nothing, and production operations have now been shut down completely. Slight increases were noted for Iraq and Qatar.

Other areas.—There was little change during August in other areas of the free world. Small increases were reported in Germany and France, but these were more than offset by decreases in the Netherlands and Egypt.

Information from behind the Iron Curtain indicates that Austrian production is on the increase as a result of the new discoveries and a stepped-up drilling program. Austria is now producing about 40,000 bbl. per day.

TREND OVER THE LAST YEAR

1950—	Western Hemisphere	Middle East	Total foreign less Russia and E. Europe
September	2,146.1	1,803.7	4,297.1
October	2,185.7	1,893.2	4,428.9
November	2,213.8	1,899.1	4,474.1
December	2,213.6	1,988.9	4,563.0
1951—			
January	2,210.9	1,874.2	4,450.9
February	2,220.3	1,947.4	4,536.8
March	2,254.1	1,961.1	4,581.1
April	2,261.5	2,013.4	4,632.1
May	2,314.0	2,203.8	4,878.4
June	2,335.5	2,172.4	4,877.8
July	2,374.5	1,835.5	4,579.0
August	2,373.3	1,790.7	4,533.7

MIDDLE EAST

Iran Settlement Remote

U. N. shelves issue; no further action expected until January unless British, Iranians reach new agreement

SETTLEMENT of the Iranian oil question this week seemed more remote than at any time since early last March, when a committee of the Iranian Parliament first recommended "nationalization" of Anglo-Iranian Oil Co., Ltd.

The Security Council of the United Nations last week found itself unable to agree on any proposal placed before it and adjourned without taking any action.

Shelving of the issue by the U. N. means that there probably will be no further development at this level until the middle of next January unless, in the meantime, some sort of agreement is reached between the British and Iranian governments.

Failure of the Security Council to vote on any proposal tosses the expropriation issues back in the lap of the International Court of Justice in The Hague, whose earlier rulings have been ignored by Iran.

The court weeks ago directed both Britain and Iran to maintain the status quo of oil operations in Iran while the court studied the issues placed before it by the British Government. Iran defied the court by ordering all British oil-industry personnel out of the country, holding that the nationalization issues were merely a dispute between Iran and the oil company and that the court therefore had no jurisdiction in the case. The court now must rule on Iran's charge that it is incompetent to hear the case. Since it granted Iran until January to submit its arguments supporting its claim that the court is without jurisdiction, the court presumably cannot rule on the question until after that date.

Outside efforts lag.—Efforts of neutral countries, principally the United States, toward mediation of the difference between Britain and Iran, were less and less noticeable. Iran's premier, Mohammed Mossadegh, has refused continually to accept any sort of compromise and has declared several times since his arrival in the United States that while his country is ready and willing to negotiate with Britain, the negotiations must be confined to payments due Anglo-Iranian for the company's facilities in Iran and to Iran's proposed sale of oil to Britain.

Co-op plan rejected.—A settlement proposal put forth by the International Cooperative Petroleum Association also was rejected by Iran.

Hussein Fatemi, Mossadegh's assistant, said the plan, which called for creation of a cooperative to handle Iran's oil industry, was rejected because it provided for a board of directors on which the Iranians would be in a minority.

Abadan to start up.—In Teheran, official sources announced that an attempt will be made soon to put the huge Abadan refinery back on stream using such Iranian and foreign technicians as are available. They also announced the arrival of the first foreign technician to be hired by the Iranian National Oil Co., a Swedish technician. Iranian representatives also were dickering with refinery technicians in Germany and discussions were under way in Mexico toward the same end.

The Teheran announcement said the Iranians will try to produce enough kerosine and fuel oil to replace stocks used since the refinery was shut down completely in July.

ASIA

India Plans Plants

Two synthetic-fuels units would cost $110,000,000

PLANS for construction of two synthetic-fuels plants in India at a total cost of approximately $110,000,000 have been submitted to the Indian Government by Koppers Co., Inc.

Conversion of coal to liquid fuels has interested the Indian Government for a long time. The country's 1950 crude-oil production averaged less than 5,000 bbl. per day, meeting only a small fraction of the nation's requirements. Synthesis has been looked to as a step toward self-sufficiency, for one thing, and as a means of reducing the drain on its foreign exchange.

The plan submitted by Koppers, and now under consideration by the National Planning Commission and a special committee of the Council of Scientific and Industrial Research, envisions construction of one plant costing $66,360,000 and a second costing about $43,400,000.

Capacities.—The larger plant would have a daily output of about 2,200 bbl. of aviation gasoline, 2,000 bbl. of motor fuel, about 3,000 tons of coke, and other products. The smaller plant would produce daily about 1,400 bbl. of aviation gasoline, 550 bbl. of motor fuel, 1,250 tons of coke, and other products.

The Koppers Co. report estimated the yearly profit on the larger plant at about $7,560,000 and that of the smaller plant at about $3,164,000.

In a report submitted several months ago when one plant was under consideration, the company also had recommended erection of a 20,000-bbl. refinery at Bombay to operate on imported crude oil. No mention of this project was contained in the government announcement that concrete proposals for the synthesis plants are now under study.

While India is not highly mechanized and its oil needs are low compared with many other countries, it has had to depend heavily on imports, chiefly from Iran.

Imports—During the fiscal year ended March 31, 1950, for example, the country imported products at an average rate of slightly more than 60,000 bbl. per day. Major product imported was fuel oil, amounting to 9,667,000 bbl. for the year. Other imports included 5,680,000 bbl. of kerosine and 5,069,000 bbl. of gasoline.

(Additional international news will be found on pages 88, 89, and 196.)

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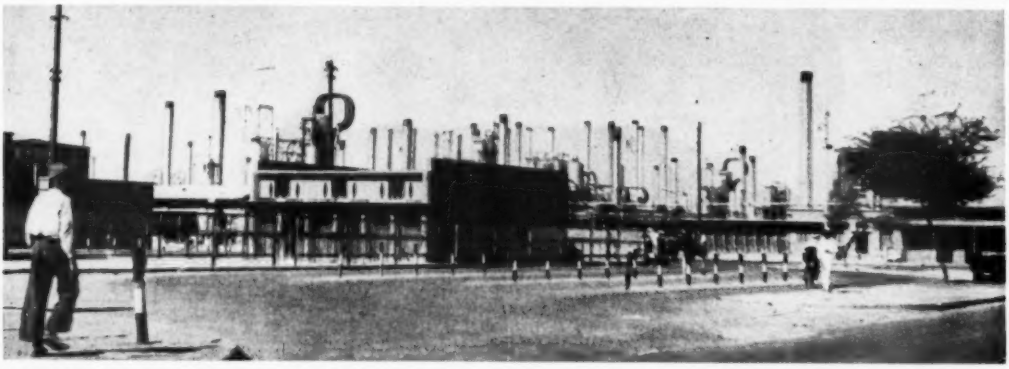


ENTRANCE.—This entrance to the Abadan refinery, formerly a busy area when Anglo-Iranian Oil Co., Ltd., was operating the plant, is deserted now that the plant has been closed down. Only a small maintenance crew is on duty at the refinery, but Iran hopes to have a full force of technical workers on hand soon in an effort to get the plant operating again.

Abadan Today

Exclusive Journal photos show desolation of the world's largest refinery, now an idle giant under Iran's control

THE desolation surrounding the world's largest refinery—a complicated array of expensive installations which once bustled with activity to process more crude oil than any other plant—is appalling, Dahl M. Duff, the Journal's international editor now on a tour of the Middle East, reports.

The lack of activity at the plant, which Anglo-Iranian Oil Co., Ltd., operated and enlarged over a period of 40 years, can be visualized by these photographs, taken by Duff in Abadan and just received in this country. Duff was invited to visit the refinery by the Iranian Government *(The Oil and Gas Journal, October 18, 1951, pages 69-71).*

The only facilities now operating at Abadan are the power plant, maintenance shops, and canning plant—the latter running on a reduced scale.

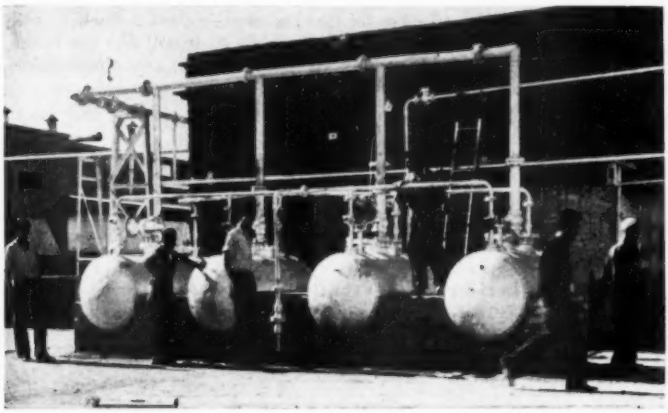
Large storage.—Enough storage is on hand to last Iran for 2 years, but it will be 2 months before enough will be drawn off to allow the country to start operation of any of the stills, Duff reports.

The maintenance staff is being directed by F. Ashraf, acting works manager who worked for Anglo-Iranian 16 years, lastly as assistant chief chemist; and P. Fattahr, shops superintendent. Ashraf was educated at Wayne University, Detroit, and did postgraduate work in chemical engineering at University of Oklahoma in 1935.

This week Iran announced that it hopes to put the refinery back into operation.

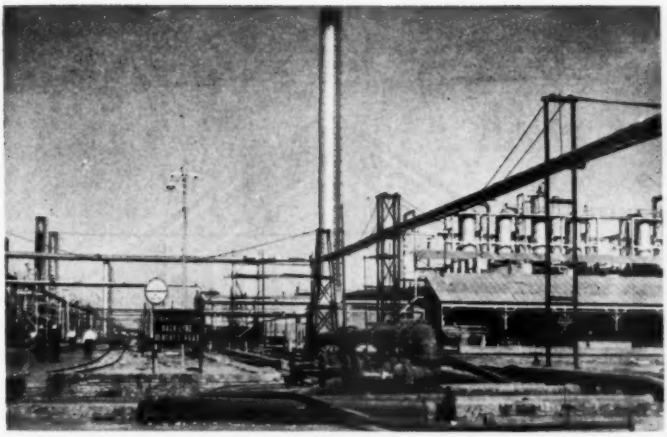
Iranian and foreign technicians now available would be used for this purpose, with foreign technicians being hired to oversee the operation, Teheran officials reported.

One urgent need is to get the lubricating-oil units operating. This new plant was almost ready to go on stream when the refinery was shut down. Since imports from Anglo-Iranian have stopped, lubes have become critically short.

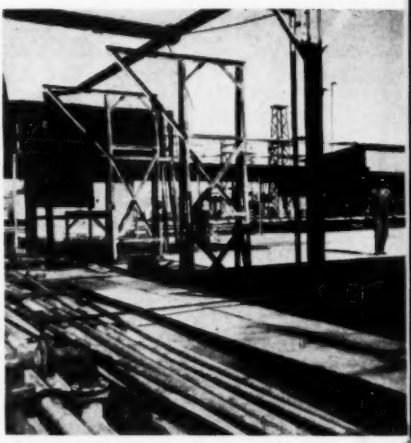


NOTHING MUCH TO DO.—These Iranian workers try to look busy as the camera catches them on a maintenance tour. Many Iranians, formerly employed by the British, appear to comprehend the immense task ahead in keeping the plant in tip-top condition, but feel they can do the job satisfactorily.

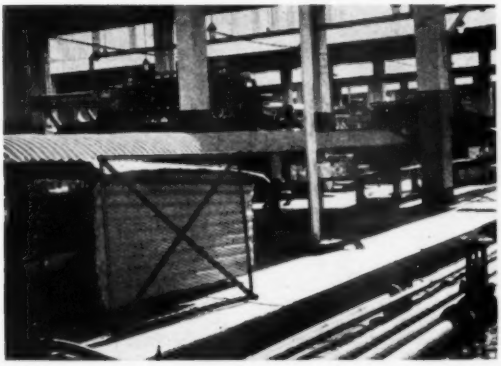
IN CHARGE.—These Iranians are in charge of the Abadan refinery. At left is P. Fattahr, shops superintendent, and at right is F. Ashraf, acting works manager formerly employed by Anglo-Iranian as assistant chief chemist.



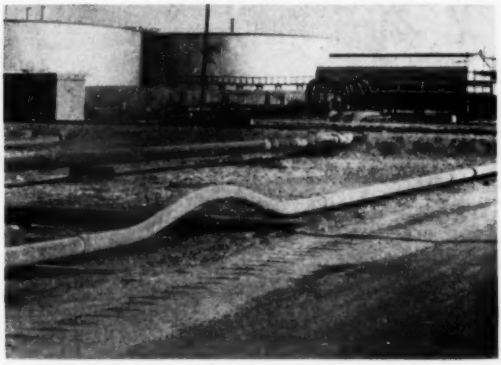
NOT RUNNING.—These units at the Abadan refinery are now shut down, with only the most important maintenance work being carried on by employes of Iranian National Oil Co., the firm now in charge of Anglo-Iranian's former facilities. Only facilities at the refinery now in operation are the power plant, maintenance shops, and canning plant. Even if Iran started up the entire refinery, there as yet is no market for products.



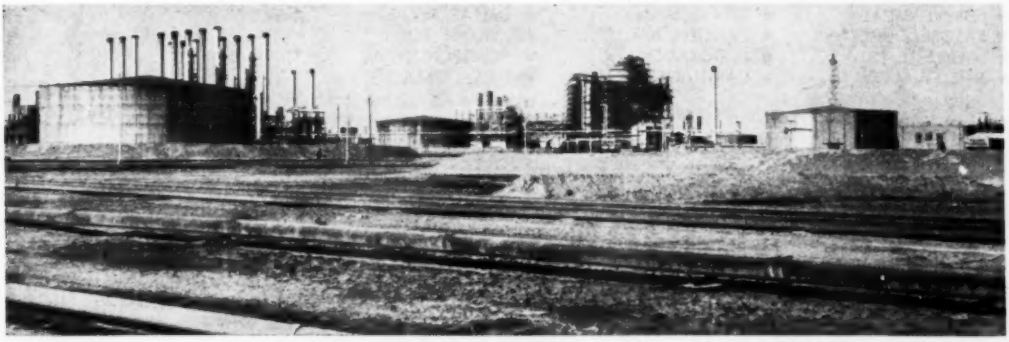
IDLE.—Another inactive area of the refinery, photographed by the Journal's international editor, Dahl M. Duff, on his recent visit to Abadan. Iran is reported hiring foreign technicians.



P.O.D.—Known as the Packaged Oil Department, this canning plant is in operation at Abadan, but only on a limited scale. The Iranians are running about 4,000 tins per 8 hours, compared with Anglo-Iranian's running of 24,000 tins in the same period. They will soon be out of tin.



STORAGE AREA.—Above is part of the huge storage facilities at Abadan—full to capacity—and a refinery crude pump house. Enough products are in storage to last Iran 2 years, and it will be at least 2 months before enough can be drawn off to allow at least one unit to resume operation at the refinery.



BIG TASK.—This general view of the Abadan refinery was taken by Dahl Duff, international editor of the Journal, on his recent visit to the plant. There is practically no possibility that the Iranians can, unaided, start and keep in operation the entire plant, which includes catalytic cracking, aviation-gasoline, and lube-oil manufacture.

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PERSONALS

Takes New Post

Whiteford joins Gulf as executive vice president

WILLIAM K. WHITEFORD, chairman of the board of British American Oil Co., Ltd., Toronto, and president of British-American Oil Producing Co., Tulsa, has resigned, and on December 1 will join Gulf Oil Corp. as a director and executive vice president.

A native of Los Angeles, Whiteford began his career as a production engineer in the oil fields after graduating from Stanford University in 1922. Working in the field as a roustabout, as a member of a rotary-drilling crew, and as an assistant driller, he came to know the producing business from every angle.

After working several years with Western Union Co. and Shell Oil Co., he joined a consulting firm. He later became associated with Barnsdall Oil Co., and before long was transferred to the Tulsa office and successively became general superintendent and vice president and general manager of Barnsdall's Mid-Continent division.

In 1935 he joined British-American as executive vice president in which capacity he was responsible for the discovery and development of the north extension of Oklahoma City field.

He was named president of the firm in 1942 with headquarters at Tulsa, and at the same time was elected executive vice president of the parent company, British American Oil Co., Ltd. He was elected president of the parent firm in 1943, and chairman of the board of directors in August 1951.

W. L. Naylor, controller, and **Ralph O. Rhoades,** executive assistant to the vice president in charge of production, were elected vice presidents of Gulf Oil Corp. at a board of directors meeting this week. Naylor, who joined the firm in 1920, was sent to Tampico, Mexico, in 1923 as chief accounting and financial officer. He was transferred to the controller's staff in Pittsburgh in 1928, and was elected controller of the corporation in 1948. Rhoades is also a veteran of Gulf having joined the firm in 1926, when he was employed as a geologist and sent to Colombia on his first assignment. From there he was sent to the Middle and Far East, and spent 4 years in the Netherlands East Indies. He returned to the Pittsburgh geological staff in 1933 and after 2 years was sent to Europe and the Middle East. In 1940 he returned to Pittsburgh as assistant staff geologist, was named chief staff geologist in 1948, and a year later became chief of land and exploration branch of the production department. He was appointed

W. L. NAYLOR

R. O. RHOADES

executive assistant to the vice president in charge of production in January 1951.

John W. Watts, owner of Lewis & Watts Drilling Co. at Magnolia, Ark., has joined the foreign-production division of the Petroleum Administration for Defense at Washington as industry analyst.

Coler Yoakum, Jr., has opened offices at Scottsbluff, Neb., for **E. A. Obering,** oil producer of Mount Vernon, Ill.

M. A. Westbrook, supervisor of Shell Oil Co.'s production laboratory at Houston, has been transferred to the Houston production division as exploitation engineer. At the same time **K. A. Ring,** exploitation engineer, took over supervision of the laboratory. Other changes include: **V. L. Lewis,** gas-test engineer, transferred from Provident City to Sheridan, Tex.; **L. A. Miller,** mechanical engineer, transferred from Houston to Tulsa; **J. A. Newman,** reservoir engineer in the Houston production division, promoted to division reservoir engineer; and **K. F. Pilgram,** exploitation engineer, transferred to the Pacific Coast area.

George C. Clark has resigned as district geologist with Stanolind Oil & Gas Co., and opened consulting offices at Tyler, Tex. Clark, who has been with Stanolind for the past 17 years in the North Texas-New Mexico division. **R. T. Stotler, Jr.,** from Alberta, Canada, is replacing Clark as district geologist at Tyler.

W. Carey Summy, assistant division superintendent at Oklahoma City for Sinclair Oil & Gas Co., is being transferred to Corpus Christi in the same capacity for the company's South Texas division.

Hiram J. Carson, first vice president of Northern Natural Gas Co. of Omaha, received the distinguished-service award of the American Gas Association at the thirty-third annual convention October 15-17 at St. Louis. Carson has been prominently identified with construction and operation developments for many years and the award was made in recognition of his contribution to the use of large-diameter pipe in natural-gas transmission.

Rex L. Smith, assistant manager of pipe lines and crude-oil purchasing for Skelly Oil Co. at Tulsa, has been promoted to manager of pipe lines, and **John B. Sleeper,** of the crude-oil purchasing department at Wichita, has been transferred to Tulsa and promoted to executive assistant and manager of crude-oil purchasing. Smith has been with the firm since 1930, and Sleeper since 1936. These changes came about as a result of the resignation of **Robert F. Pielsticker,** who has joined Stanolind Oil Purchasing Co.

Floyd B. Inks, Jr., recent petroleum-engineering graduate from University of Texas, has rejoined the Houston production division of Gulf Oil Corp., as an engineer trainee attached to the Beaumont, Tex., area.

Jeff L. Hamilton, formerly operating supervisor for Lone Star Gas Co., at Tyler, Tex., has joined Transcontinental Gas Pipe Line Co. at Eunice, La., as division superintendent.

Max B. Payne, formerly geologist for Signal Oil & Gas Co., has been appointed vice president and general manager of Natural Gas Corp. of California at Los Angeles.

O. R. Gammon is party chief of a new Sun Oil Co. gravity crew assigned to do special survey work from headquarters in Altus, Okla. **William Guest,** former Sun seismograph party chief, has been transferred to the firm's Beaumont, Tex., staff as a field superintendent.

PERSONALS

New President

Stanolind Oil Purchasing names Pielsticker as head

ROBERT F. PIELSTICKER was elected president of Stanolind Oil Purchasing Co. at a meeting of the board of directors this week. He will take over his new duties on November 16.

Pielsticker comes to Stanolind from Skelly Oil Co. with which he has been associated for 20 years. He has been employed in the marketing, sales, crude-oil-purchasing, and pipe-line departments at Kansas City, Mo., El Dorado, Kans., and Wichita. In 1941 he was transferred to Tulsa and promoted to executive assistant and manager of pipe lines and crude-oil purchasing.

He received his early education at El Dorado and at St. Mary's College, St. Mary's, Kans. He is a graduate of Georgetown University, Washington, D. C.

Pielsticker is widely known throughout the Southwest and is prominent in local and national oil organizations.

He replaces A. C. Sailstad, former president, who has accepted a position with Standard Oil Co. (Ind.).

J. E. R. Sheeler, Shell Oil Co., New Orleans, has been elected chairman of the Delta Section of the American Institute of Mining and Metallurgical Engineers, replacing **H. M. Krause,** who has been transferred to Houston as division engineer for Humble Oil & Refining Co.

Carl L. Hefner, production engineer for Cities Service Oil Co. at Oil Hill, Kans., has been transferred to Oklahoma City in the same capacity.

McKay Cooper, chief engineer for Interstate Oil Pipe Line Co. at Mandeville, Ark., has been transferred to Pickins, Miss., as district gager.

J. T. Higgins, formerly assistant manager of the operations-control division for Standard Oil Co. of California at San Francisco, has been named manager of operations at the company's Richmond, Calif., refinery. **M. F. Miller,** manager of construction at the Barber, N. J., refinery of California Refining Co., a California Standard subsidiary, succeeds Higgins at San Francisco.

James W. Batchelor, formerly at Wichita, and **William C. Durham, Jr.,** formerly at Durango, Colo., have been transferred to Pure Oil Co.'s geological staff in Oklahoma City.

William R. Boyd, III, who has been serving as a consultant to the munitions board on questions of protection of petroleum facilities, and detailed to advise the Petroleum Administration of Defense on such matters, has been appointed director of PAD's facility security division, to serve without compensation. Boyd, who prior to joining the Air Force in 1942, was loaned to the Petroleum Administration for War in 1945, taking over plant-security responsibility for a refinery seized by the federal Government. Since the war he has been with Petroleum Advisers, Inc., New York.

J. E. Matter has been named vice president in charge of exploration for British-American Oil Producing Co. at Tulsa. He was formerly division exploration manager of the southwestern division at Fort Worth, Tex. After graduating from the University of California at Los Angeles he spent 2 years studying in Germany. After 2 years in Shell Oil Co.'s geology department he joined B-A doing geology work in the Rocky Mountain area in California. He was named exploration manager for the California division in 1945, and was transferred to Fort Worth in 1950 to organize the southwestern division.

John T. Zeien, engineer in the technical department of Esso Standard Oil Co.'s Baltimore refinery, has been appointed to head the department's newly organized process design group. In the same department, **William F. Robinson** has been promoted to head the group on planning and economic studies, and **C. Gordon Green,** formerly a zone supervisor at the refinery, has been named to head the maintenance and construction division in the mechanical department. **Herbert Minich,** formerly head of refinery process work, has been transferred to the Bayway refinery as technical assistant in the oil movement and storage department.

R. S. Christie, production engineer for Amerada Petroleum Corp., has been transferred from Fort Worth to Tulsa in the same capacity.

D. A. Graham, superintendent of the grease and compounding department of Socony-Vacuum Oil Co., Inc., at Trenton, Mich., has been transferred to the company's headquarters at New York as manager of the operations division of the manufacturing department. Graham started 20 years ago with the White Star Refining Co., later acquired by Socony-Vacuum, as assistant manager of the grease plant.

J. E. Stephens, tool pusher for Delaney Drilling Co., has been transferred from Shawnee, to Chandler, Okla.

John T. Gary, production engineer at Houston for Continental Oil Co., has been transferred to Wichita and promoted to division petroleum engineer of the newly organized Kansas division.

James E. Clark, coastal division manager at Ventura, Calif., has been transferred to Casper, Wyo., as manager of the firm's Rocky Mountain division, replacing **Paul L. Kartzke** who has gone to the New York office on special assignment. Clark's new territory includes the Montana section of the important new oil producing area in Williston basin. **B. P. Eastin,** presently manager of Shell's Los Angeles Basin operations, replaces Clark at Ventura as manager of Coastal division.

Albert Gregersen has been appointed governmental-relations advisor in the foreign production division of Gulf Oil Corp. in New York. He succeeds **C. A. Baird,** who recently retired. **Augustin Pye** has been named to succeed Gregersen as branch manager in Denmark for Danish American Prospecting Co. **Kai E. Christensen** has been appointed assistant branch manager, and **Carl C. Von Elm** has been appointed general superintendent in charge of field operations.

PERSONALS

A.I.M.E. OFFICIALS.—These men, officers and councilors of the Petroleum Branch, Pacific Petroleum chapter, American Institute of Mining and Metallurgical Engineers, have had a major hand in preparing for the group's fall meeting in Los Angeles this week. Seated, left to right: R. L. Parsons, California Research Corp.; J. S. Baker, Lane-Wells Co.; and W. E. Glenn, Continental Oil Co. Standing, left to right: C. R. Dodson, University of Southern California; Paul Andrews, Signal Oil & Gas Co.; K. E. Barley, Baroid Sales Division; F. L. Wadsworth, General Petroleum Corp.; H. E. Nissen, Signal Oil & Gas Co.; M. E. Loy, Schlumberger Well Surveying Corp.; L. W. Chasteen and B. P. Kantzer, Union Oil Co.

Harold H. Reiman has been appointed manager of Pure Oil Co.'s motor-transport division at Chicago. **Val F. Gruenewald** has been named assistant manager.

G. R. Brown, district engineer for The Texas Co. at Midland, Tex., has been transferred to Fort Worth and promoted to assistant division petroleum engineer.

Charlie Henderson has been transferred from Wichita to Knob Noster, Mo., as pipe-line foreman for Cities Service Gas Co., replacing **John Belt** who resigned.

E. J. Anderson, senior petroleum engineer for Humble Oil & Refining Co., and **J. W. Smith,** petroleum engineer, both in the Galveston Bay district, have been transferred to Livingston, Tex., and promoted to district petroleum engineers. Other changes in the Gulf Coast supervisory personnel include: **H. B. Barton,** district petroleum engineer, transferred from Friendswood, Tex., to the California district; **C. W. Armstrong,** district petroleum engineer, transferred from California to Maurbro, Tex.; **J. P. McAdams,** district petroleum engineer, transferred from Maurbro to North Katy, Tex.; **J. H. Wellborn,** district petroleum engineer, transferred from North Katy to Galveston; **L. M. Sloan,** district petroleum engineer, transferred from Raccoon Bend to Friendswood, Tex.; **L. M. Duhon, Jr.,** district petroleum engineer, transferred from Sugar Valley, Tex., to Raccoon Bend; **R. E. Kilpatrick,** district petroleum engineer, moved from Lovell Lake, Tex., to Sugar Valley; **J. B. Bower,** district petroleum engineer, transferred from Livingston to California as farm boss; **W. W. Denyer,** farm boss at Galveston Bay, transferred to Anahuac, Tex., and promoted to assistant district superintendent; **Guardie Kretzschmar,** farm boss, transferred from Friendswood to Galveston Bay; and **John H. Pittman,** district civil engineer, moved from Houston to Anahuac.

J. G. Dorsey, pipe liner for Shell Pipe Line Corp., has been transferred from McCamey to Rankin, Tex., in a similar capacity. Other changes include: **P. D. Harkins,** pipe-line-maintenance foreman, transferred from Hamlin to Forsan, Tex.; **R. H. Kneer,** pipe-line-maintenance foreman, transferred from Forsan to Hamlin; and **P. E. Smith,** lead man at Denver City, Tex., transferred to Eunice, N. M., as assistant pipe-line-maintenance foreman.

R. H. Crowie, subsurface geologist for Shell Oil Co., has been transferred from Lake Charles, La., to New Orleans in a similar capacity. **S. Ellender,** head roustabout at Lake Charles, has been promoted to production foreman.

Charles E. Dimit has been elected president of the newly organized Clark Dale Drilling Co., Inc., with main offices in Dallas. Other officers elected include: **Creston Alexander,** Dallas, vice president; **Dale M. Thompson,** Midland, Tex., vice president; **J. M. Clark,** Midland, vice president, and **A. M. Early,** Dallas, secretary-treasurer. Operating headquarters will be established in Midland to serve the Permian basin and New Mexico.

F. A. Armstrong and **L. B. Horn,** of San Antonio, have formed Armstrong & Horn Drilling Co. Armstrong was formerly a partner in the firm of Armstrong & Sutton Drilling Co., and Horn is a San Antonio business man.

DEATHS

William C. McTarnahan, 68, honorary chairman of the board of Petroleum Heat & Power Co. and a director of Taylor Refining Co., died October 18 in New York. He was also a director of Petroleum Terminal Corp., and Boston Harbor Oil Co., and a former president of the Fuel Oil Association of New York.

Edwin Adolph Mauerman, 70, retired from General Petroleum Corp., died October 16 at Long Beach, Calif.

David Brooks Layton, 75, retired oil man for whom the Layton sand was named, died October 19 at Broken Arrow, Okla.

Walter Trew Woods, 71, former Long Beach, Calif., oil man, died October 14. An inventor of oil-well tools, Woods founded U. S. Tool Co. and Southwestern Tool Co. in 1921.

Donald W. Gravell, paleontologist for Cuban Gulf Oil Co. at Havana, died there October 14. From 1929 to 1940 he was associated with Gulf Oil Corp. at Houston.

Cliff Van Buren Peery, 70, head of the legal department of Skelly Oil Co.'s marketing department, died October 21 in Kansas City, Mo. He joined the firm in 1923, organized the legal department at El Dorado, Kans., in 1924, and moved to Kansas City in 1931.

H. G. Bard, 61, oil dispatcher for Gulf Oil Corp., died October 16 in Tulsa. He had been with the firm for 37 years.

David L. Brown, 28, of the marketing department of Standard Oil Co. of California, died at Los Angeles October 9.

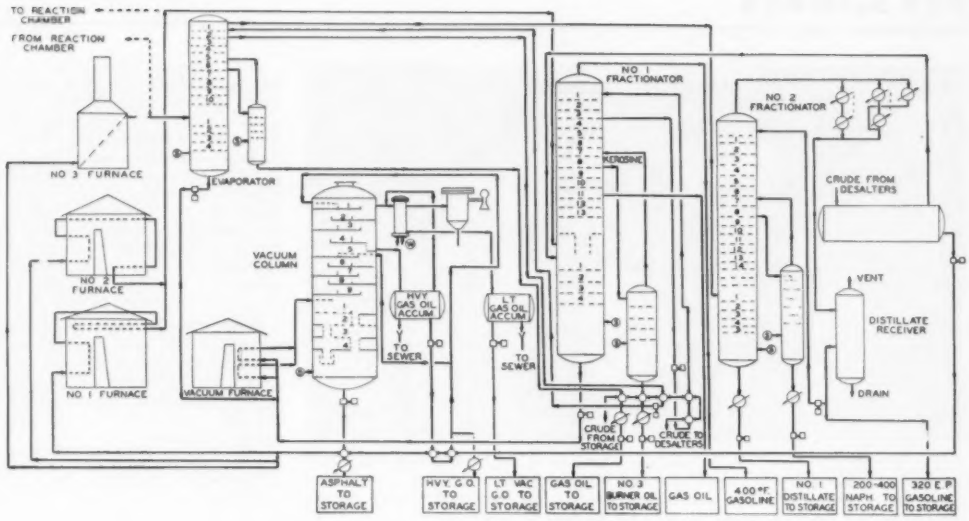


Fig. 1—Process scheme at Kerr-McGee Wynnewood, Okla., refinery.

Making a Profit on Asphaltic Specialties

Novel vacuum operation, product diversification, ups crude output from 2,500 to 9,500 bbl. per day

by John C. Reidel
Mid-Continent District Editor

KERR-McGEE OIL INDUSTRIES, INC., assumed ownership of the former Cosco refinery at Wynnewood, Okla., in 1945. Heretofore the operation had been limited to the processing of 2,500 bbl. per day of high-asphalt crude. The method employed was that of topping followed by asphalt production in two vacuum pots by two-stage vacuum reduction, with no internal construction in the pots. The process involved only straight vaporization with insufficient control as to type of asphalt made.

Kermac management in its modernization program was faced by the problem of expanding operations while running a crude charge which averaged close to 30 per cent asphalt yield. One possibility the company explored was that of going to the manufacture of a widely diversified line of asphaltic specialties. For this purpose a flexible vacuum operation was needed.

The vacuum distillation had to be one that would permit close control of penetration and softening point so that a range of base asphalts with varying specifications could be produced in a continuous operation. This problem was solved by installation of a vacuum column equipped with a bottom stripping section, and operated with intermediate reflux as well as the regular top reflux.

By careful consideration of processing limitations involved in running the high-asphalt charge, Kerr-McGee has expanded its operations to a throughput of 9,500 bbl. daily on a year-around basis. This has been accomplished through diversification of its asphalt products, as noted, and by visbreaking of reduced crude to make No. 6 fuel oil as dictated by seasonal demand and the market. A balanced operation has been achieved which produces motor and burner fuels and gas oil for catalytic cracking in addition to the various asphalt products.

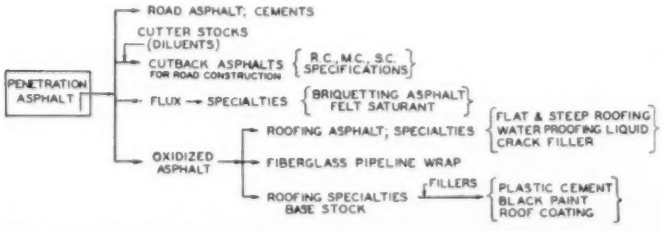


Fig. 2—A widely diversified line of asphaltic specialties is manufactured by Kerr-McGee Oil Industries, Inc. This is made possible by a flexible vacuum operation.

New Processing Setup

The process scheme adopted to obtain the high increase in throughput is indicated by the flow sheet, Fig. 1. To attain the present level of operation the following changes were made:

1. Original bubble towers (No. 1

and No. 2 fractionators) were retrayed.

2. The new, modern vacuum tower replaced the old vacuum jugs.

3. Two single-coil box heaters (one had been a crude heater while the other had originally been used for Dubbs thermal cracking) were retained for crude service.

4. The original vacuum furnace was also retained.

5. To further take care of the heating requirements occasioned by the increase in crude throughput, a vertical, cylindrical furnace was installed.

Crude Distillation

Normally the Kerr-McGee refinery operates on a mixture of four Oklahoma crudes (see below). The composite crude has a gravity of 27° A.P.I. and yields 28 per cent asphalt. Characteristics of the four crude oils used in charging blend are:

Crude—	Gravity °A.P.I.	Asphalt per cent (100 pen.)	Gasoline-naphtha per cent
Velma	28.6	16	22.0
Hoover	38.9		33.3
Butterly	14.6	59	6.5
Tussy	24.8	32	17.4

Over-all yields obtained on the composite crude are:

Product—	Volume per cent
Asphalts	28.0
Straightrun gasoline	18.0
Gas oil, kerosine, etc.	52.5
Loss	1.5
Total	100.0

Topping.—The three crude furnaces are operated in parallel as indicated in Fig. 1. The crude heated in No. 1 and No. 2 furnaces is fed to the No. 1 (crude) fractionator where separation takes place into gasoline fraction as overhead, with kerosine and virgin gas oil as side draws. The gas oil is sold to Sunray Oil Corp. for use as catalytic cracking charge. In return Kerr-McGee obtains catalytic naphtha from Sunray which is blended with the straightrun stock and with natural gasoline. Regular and premium gasoline are made by varying the proportions of cat naphtha and TEL.

The No. 3 furnace stream is fed to the old flash tower which is now operated as a bubble-tray evaporator. Overhead vapors from the evaporator go to the No. 2 fractionator. The two columns operate in conjunction to produce 320° F. e.p. gasoline, 200°-400° F. naphtha, No. 1 distillate (39°-43° A.P.I. burner oil), and gas oil.

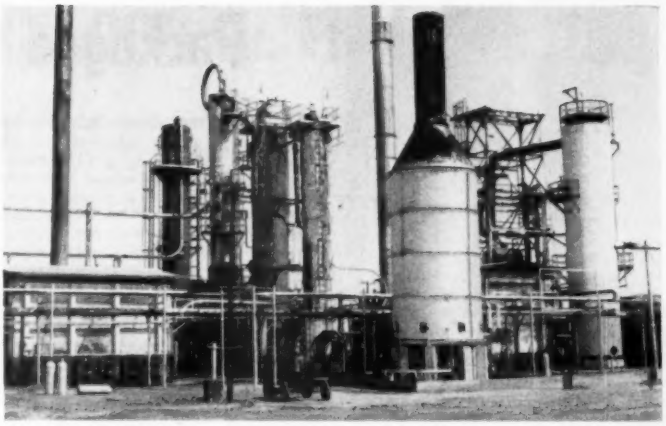


Fig. 3—In this section of the Wynnewood plant the upshot furnace is shown in the foreground with vacuum tower at the right and atmospheric distillation towers at the left.

Vacuum Operation

Reduced crude from the No. 1 fractionator and the bubble-tray evaporator (a total of some 4,000 bbl. per day) is heated to 740°-775° F. and charged just above the stripping section of the vacuum tower. Vacuum is maintained at 20 to 28 in. mercury. Distillation is conducted as a wet distillation (i.e. steam is admitted to the vacuum column at the rate of about 1,500 lb. per hour).

The stripping section in the lower part of the column consists of four bubble trays. Although a high pres-

(Continued on page 138)

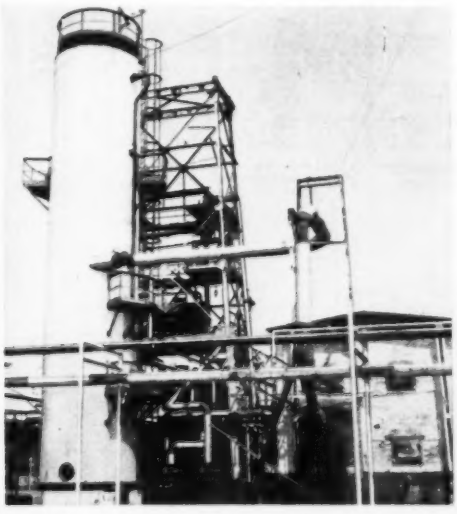


Fig. 4—Vacuum tower is operated with intermediate reflux as well as the regular top reflux, permitting manufacture of a wide range of base asphalts.

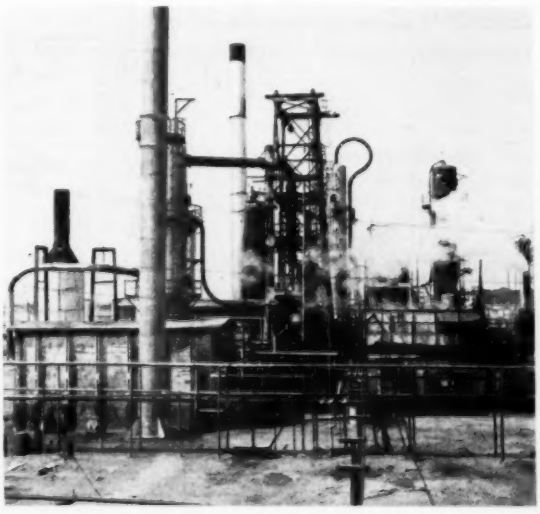
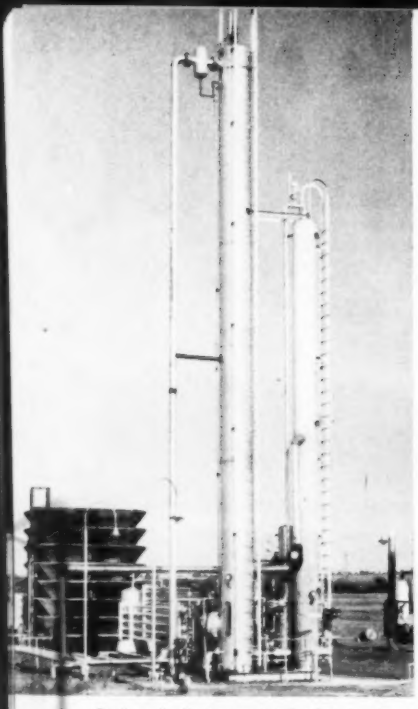


Fig. 5—View of process area at Wynnewood refinery. Crude topping, asphalt manufacture and visbreaking are employed at this plant for processing of high-asphalt crude.

Packaged Gasoline Plant



Packaged plant operated by Westoc Gasoline Co. in West Edmond field, Oklahoma.

by Thoren Priest Cook*

THERE are numerous places in the oil fields where relatively small volumes of casing-head gas or stock-tank vapors are lost because it is not economically feasible to process them in the usual manner. This is the case when the wells or traps are located far from any existing gas-gathering facilities and when the production is from a rather small field.

This problem has recently gained emphasis since the various state regulatory bodies have been getting more stringent on flared gas. Some companies operating high gas-oil-ratio wells have been required to shut in the field until an outlet for the gas could be obtained.

In many cases gas injection is one solution to the problem. If a gas-injection station is installed, the equipment required for removal of the gasoline components from the gas previous to injection will generally show a favorable payout. In such an installation, the gas production can be pumped directly into the crude-oil transfer line. In other cases the wet gas is sold without adequate removal of gasoline components.

*Chief process engineer, Southwest Division of Chemical Plants Division, Blaw-Knox Construction Co., Tulsa.

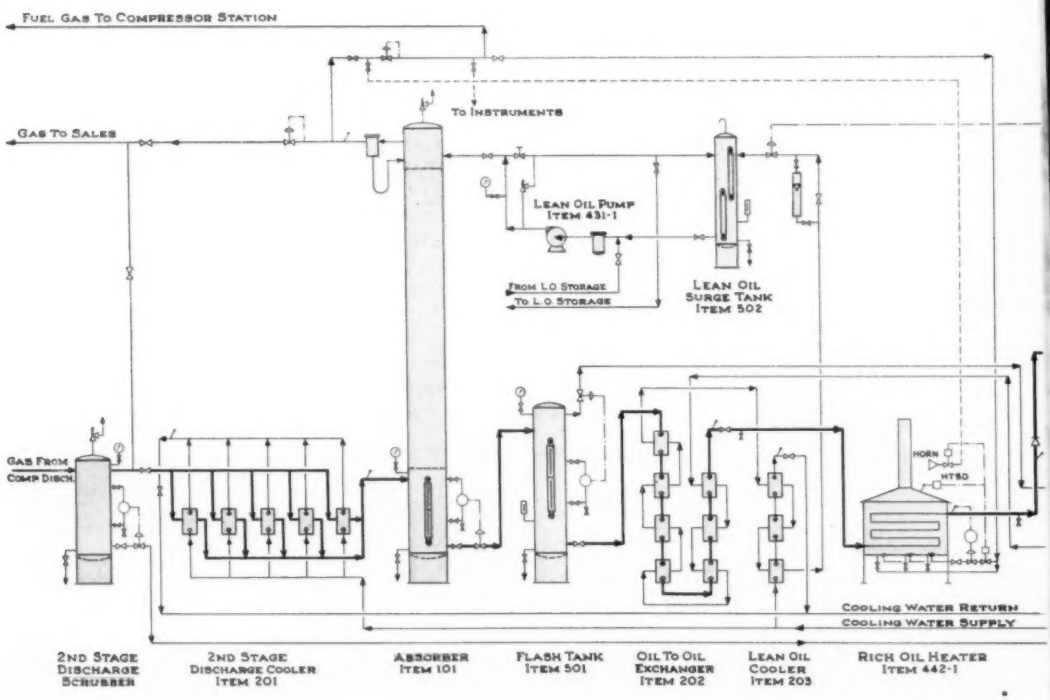
To process small volumes of gas economically, several features must be incorporated in the design of the unit. Naturally, the investment must be held to a minimum, the operating and maintenance-labor requirements should be small, and the plant should have a high salvage value.

All of these conditions were met with considerable success in the unit recently installed for Westoc Gasoline Co. in West Edmond field, approximately 3 miles north of Bethany, Okla. This unit was designed for 5,000,000 cu. ft. per day of gas.

Process Description

The description which follows is illustrated diagrammatically in the accompanying flow chart. Gas from separators in the area is compressed, cooled in fin-tube second-stage discharge coolers 201, before it passes into the base of the bubble tray absorber 101. The residue gas stripped of gasoline components is sold to a nearby power plant.

Rich oil flows from the base of the absorber into flash tank 501 where a reduction in pressure permits flashing sufficient stripping vapors for the still. Flashed rich oil flows through heat exchangers 2-2 countercurrent



Processing 5,000,000 Cu. Ft. of Gas Daily

No steam-generating facilities or instrument air compression required in this West Edmond plant

to the hot lean oil, and then into a direct-fired heater 442-1. Partially vaporized rich oil from the heater enters the midsection of the still 102 which is a column packed with Raschig rings. The vapor portion of the feed and the vapor stripped from the lower section, travel up the column which is refluxed with gasoline in order to condense vaporized lean oil.

The liquid portion of the feed and the liquid from the upper section of the column travel down the lower section of the column being stripped of gasoline components by the ascending stripping vapors. Vapors from the top of the still are partially condensed in the fin-tube condensers 204 and pass to the reflux tank 503. The uncondensed vapors from the reflux tank as well as vapors from the product storage tanks 304, recycle to the compressor suction.

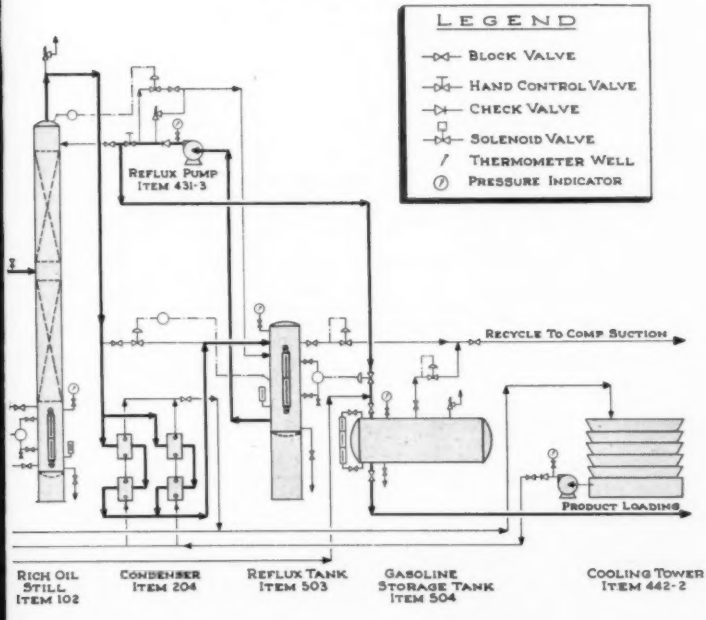
Gasoline is removed from the reflux tank by pump 431-3 which discharges a controlled portion to the top of the still as reflux and the remainder to the storage tank from which it is loaded into trucks for sale. The hot lean oil is cooled by water coolers 203 as it flows the lean-oil surge tank 502. Lean oil is pumped from this tank to the top of the absorber by means of pump 431-1.

It should be noted that no steam-generating facilities or instrument air compression are required in this plant. The instruments are operated on gas pressure, and the direct-fired heater and dry stripping eliminate the need for steam. The cooling load is carried by the small atmospheric cooling tower 442-2.

TABLE 1—APPROXIMATE OPERATING CONDITIONS

	Pressure (psig.)	Temp. (°F.)
Absorber inlet gas	175-220	85
Lean oil		85
Flash tank	40	
Rich-oil heater outlet		495
Still top		205
Still bottom	35	455
Still reflux tank	30	100
Gas volume, s.c.f.d., containing 2,380 gal. per day pentanes plus		5,000,000
Oil circulation, g.p.m., 180 mol wt.		15
Gasoline production, gal. per day, 34-lb. R.v.p.		2,500
Residue sales volume, s.c.f.d.		4,933,000

PACKAGED GASOLINE PLANT
FLOW DIAGRAM



Control System

The control system is designed for fully automatic operation but each control has been carefully selected for simple operation with little maintenance. The controls are more or less conventional as can be seen by examination of the flow chart. The only special features are on the rich-oil heater and the still reflux tank. The rich-oil heater is provided with a high-temperature safety device which will shut down the furnace by means of a solenoid valve on the fuel. At the same instant, another valve blows a horn which warns the operator.

The still reflux tank is provided with a very simple type of temperature control which bypasses sufficient vapors around the condensers to maintain a controlled temperature on this tank. Since the pressure on this tank is set, controlling the temperature permits operating the plant so as to produce a given grade of gasoline within certain limits. A temperature control on the top of the still regulates the reflux to hold the end-point specification on the finished gasoline. The whole system operates quite smoothly, thereby requiring only a part of the regular engine operator's time.

Utility requirements when processing 5,000,000 cu. ft. of gas per day are listed in Table 2.

TABLE 2—UTILITY REQUIREMENTS

Electrical power, kw.	12.0
Furnace fuel, M.s.c.f.d.	39.0
Cooling tower makeup, g.p.m.	3.0
Recycle compressor power, b.hp.	23.4

Construction Details

To hold field erection costs to a minimum and provide for rapid moving of the unit from one location to another with small loss in investment, most equipment is built upon rigid structural steel channel skids. The heater unit is on one skid and all other equipment shown in the flow chart, with the exception of the inlet-gas scrubber, storage tank, and cooling tower, are on another skid. All piping within the limits of the skid is prefabricated.

If conditions so dictated, the whole plant could be transported to a new location easier than the average drilling rig can be moved. The only investment loss would be the concrete foundations and the cooling-tower pit. This means that 80-90 per cent of the investment in a unit such as this is salvable.

Rock Hardness

vs

Rock Penetrability in

Making Hole

W. B. Mather*

The author outlines the incongruities between these two terms as they apply to rock drilling. He points out that rate of penetration should be referred to, rather than hardness of the rock, in describing the ease or difficulty with which the various types of rocks may be drilled.

A ROCK is defined as a naturally formed mass of mineral matter. Mineralogically it may be composed of one mineral or several. The physical properties of a rock would appear to depend to a large degree on the physical properties of the component minerals. Other factors, such as degree of consolidation, induration, porosity and grain shape and size, also have a marked effect on the physical characteristics of a rock and the ease with which it may be drilled.

In drilling, the rock physical properties of most interest normally are hardness and penetrability. These two terms are not one and the same, although they are employed synonymously by the industry. The existing confusion is caused by a lack of specific definitions for the two terms as well as insufficient data on the basic elements that are responsible for these rock properties.[1]

The object of this paper is to outline the incongruities between the terms "rock hardness" and "rock penetrability" (drillability) as they apply to rock drilling.

Rock Hardness

The following discussion is designed to demonstrate that the usage of the term rock hardness varies,[2] depending upon whether one is discussing diamond, rotary, or cable-tool drilling. Rock hardness to the diamond driller is resistance to abrasion, to the rotary driller it is resistance to compression, while to the cable-tool driller it is resistance to impact. The three types of hardness—abrasive, compressive, and impact—are conflicting variables for different types of rock.

Abrasive hardness.—In diamond drilling, the resistance of a rock to abrasion is employed as a measure of hardness. It is therefore referred to as abrasive hardness.

Moh's scale of hardness, based on the resistance of a mineral to abrasion, although only relative in character, has been universally employed for the past 133 years as the principal method of measuring the hardness of a mineral and therefore of a rock. In 1933 Ridgeway, Ballard, and Bailey[3] modified the upper portion of Moh's scale as shown in Table 1.

TABLE 1—MODIFICATION OF THE UPPER PORTION OF MOH'S SCALE

Moh's scale	Extension
(6) Orthoclase	(6) Orthoclase or periclase
	(7) Vitreous pure silica
(7) Quartz	(8) Quartz
	(9) Garnet
(8) Topaz	(10) Topaz
	(11) Fused zirconia
(9) Sapphire	(12) Fused alumina
	(13) Silicon carbide
(10) Diamond	(14) Boron carbide
	(15) Diamond

TABLE 2—MEASUREMENT OF ABRASIVE HARDNESS

	Scale—Corundum = 9, Diamond = 10	Scale—Quartz = 7, Corundum = 9
Rock crystal quartz	8.94	7.0
African crystal corundum	9.00	9.0
Fused alumina, %	9.03	10.0
Fused alumina (3.14% TiO_2)	9.06	11.0
Tungsten carbide (13% cobalt)	9.09	12.0
Green silicon carbide	9.13	13.4
Black silicon carbide	9.15	14.0
Boron carbide	9.32	19.7
South American carbonados	9.82	36.4
Belge Congo gray opaque (cubic xals)	9.89	38.7
Belge Congo clear white (cubic xals)	9.95	40.7
Belge Congo yellow (cubic xals)	9.96	41.0
South American ballas	9.99	42.0
South American brown bortz	10.00	42.4

Woodall,[4] in 1935, measured the relative resistance of minerals to abrasion during lapping and proposed further modifications of Moh's scale as shown in Table 2. These refinements were made in an attempt to eliminate the relative character of Moh's table and to substitute hardness values that would provide a numerical measure of the comparative resistance of the minerals to abrasion (hardness).

In other words, the hardness ratio of South American brown bortz to quartz is 6:1 instead of 10:7 as one would infer from the old Moh's scale. The low tensile strength of diamonds permits their use only in diamond drilling where the load on the bit is relatively small and impact is reduced to a minimum. However, in the case of silicon carbide and fused alumina, which also have low tensile strengths, their lower hardness values do not permit their economical use in the facing of drill bits. After diamonds, boron carbide is the hardest mineral substance, and although it is very resistant to abrasion, its low tensile strength prevents its use as a cutting medium.[5]

Tungsten carbide, because of its greater tensile strength and a hardness value of nearly twice that of quartz, has been found to be the most satisfactory material for the facing of rotary and percussion bits where load and impact factors are of major importance.

Haworth[6] in a study of the abrasive wear under low unit pressures of various materials on steel found that relative abrasiveness of the abrasive varied with the type of steel. He also found that the angularity as well as the hardness of the grains were of importance. Table 3 is a revision of Haworth's original table.

TABLE 3—ABRASIVENESS OF VARIOUS MATERIALS

Abrasive material	Moh's hardness	Weight loss ratios* 1045 steel	Weight loss ratios* High-C high-Cr
Fused alumina	9	175	94.0
Crushed quartzite	7	163	10.5
Ottawa sand	7	26.2	2.8
Crushed feldspar	6	68.8	3.0
Slate	<6	24.0	1.0

*Obtained by arbitrarily assigning a value of 1.0 to the weight loss obtained by the high-carbon high-chromium steel using slate as the abrasive.

*Southwest Research Institute, San Antonio. Presented at A.S.M.E. Petroleum Mechanical Engineering Conference, Tulsa, September 1951.

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Sharp logs with high peaks, more breaks, straighter sides, greater definition, and more definite markers have been produced with the new McCullough Radiation Well Logger. Some of the most difficult zones in Texas and California have been logged with outstanding results in the last 12 months. New, thin producing zones have been located—zones that had formerly been missed completely! These logs by actual comparison, are SHARPER than an S.P. or Resistivity log, although made through several strings of casing!

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It was formerly thought impossible to decrease the length of the counter and at the same time increase its sensitivity. It has been acknowledged that IF such a counter could be developed, a sharper, more accurate log would result.

In order to get such results it was necessary to depart from usual methods of detecting gamma ray radiation. The counter in the new McCullough Radiation Well Logger is the McCullough Scintillometer—a solid counter. Because of its high density it is capable of detecting practically ALL gamma rays striking it. It is shorter in length than the radius of any hole it may be run in, yet it is a great many times MORE sensitive than any counter of equal length.

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This extremely small counter permits logging even the THINNEST beds at their TRUE radioactive level. Base of the break on the log IS the base of the bed—thick or thin.

The supersensitivity of the McCullough Scintillometer permits considerable greater detail in the completed log, since:

1. Its efficiency is close to 100%.
2. It is equally sensitive to high and low energies, yet it does not record meaningless counts (No background radiation).
3. The high count rate, increased running speed, and decreased time constant gives less drag or lag at formation edges.

AVAILABILITY

The McCullough Radiation Well Logger is now available in Texas and California. Other instruments are in production and will be made available in all other areas as fast as we can obtain necessary supplies and equipment. Contact the McCullough Service Engineer in your locality for latest information.

EASIER, MORE ACCURATE INTERPRETATION BECAUSE:

1. Thin beds are logged at their TRUE radioactive level.
2. A greater detailed log although run two or three times faster.
3. Curves produced contain more breaks, greater definition, more definite markers.
4. Original log is sharper than an S.P. or Resistivity log.
5. Original log DOES NOT need retouching or redrawing.
6. It is calibrated in International Units permitting quantitative measurements of radioactive radiation.
7. Since it has no instrument or temperature drift, it can be used as a future reference tool.
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9. It has located new producing zones where other methods had failed to record.
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Since crushed quartzite and Ottawa sand are both mineralogically composed of quartz, one would expect that both would exhibit the same hardness and abrasiveness. A study of the table reveals that this is not true as the ratio of abrasiveness of crushed quartzite to Ottawa sand in the case of 1045 steel is 6.6:1 and with high-carbon, high-chromium steel is 3.75:1. The higher abrasiveness of the crushed quartzite is not due to a difference in mineral hardness, but rather to the angularity of the crushed quartzite grains as compared to the subrounded to subangular grains of Ottawa sand.

It should also be noted that crushed feldspar proved more abrasive than Ottawa sand, in spite of the fact that feldspar is less able to withstand abrasion and therefore is softer than quartz. Here again the angularity of the feldspar grains as compared to the more rounded sand grains is probably one of the principal deciding factors as far as abrasiveness is concerned.

The above discussion stresses the point that although some materials, such as boron carbide and quartz sand grains, are themselves very resistant to abrasion and therefore hard, they are not as effective an abrasive as other materials of less or equal hardness but of a different physical character. The resistance of a mineral or rock to abrasion may therefore arbitrarily be employed as the measure of hardness and not the ability of the mineral to abrade another material.

Impact hardness.—Resistance to impact or indentation is the principal type of hardness involved in percussion drilling. Klapka[9] presented the data shown in Table 4 based on the indentation tests of Knoop, Peters, and Emerson of the National Bureau of Standards and Wooddell's abrasion tests previously mentioned, as compared to Moh's scale of hardness.

TABLE 4—MOH'S SCALE COMPARED WITH INDENTATION AND ABRASION TESTS

	Moh's
Indentation tests:	
Diamond 8200-8500	10
Silicon carbides 2050-2140, corundum (sapphire) 1700-2200	9
Tungsten carbide 1050-1500, topaz 1250	8
Crystalline quartz 710-790	7
Gypsum 32	2
Talc	1
Abrasion tests:	
Diamond 42, black silicon carbides 14, tungsten carbide 12	10
Corundum 9	9
Quartz 7	7

The variance in the comparative hardness of the materials by the two methods of measurement are obvious, where the ratio of diamond to tungsten carbide and to quartz by the abrasion test is 3.5:1 and 6:1. By the indentation method, it is more than 7:1 and more than 10:1. More conspicuous, however, is the reversal of position of tungsten carbide and corundum in the two tests with tungsten carbide, the harder material by abrasion tests, and corundum, the harder by the indentation method.

Irrespective of these laboratory tests, in actual drilling practice tungsten carbide is used in facing percussion tools because of its toughness and ability to withstand impact. The materials shown to be most resistant to impact by the indentation tests, such as diamonds, silicon carbides, and corundum, cannot be used because of their ease of fracture under impact. It therefore appears that in measuring impact hardness, other properties such as elasticity and tensile strength of the material are the governing factors which should be determined.

Compressive hardness. — Scott,[8] in discussing hard-rock rotary drilling, defines hardness of a rock as "its comparative crushing strength or resistance to penetration." A perusal of the literature dealing with rotary drilling usually presents the thesis that the term rock hardness is a measure of resistance of a rock to compression or its compressive strength. It is therefore referred to as compressive hardness. Table 5 compiled by Norton & Co.[10] presents data on compressive hardness of various materials.

Rock hardness means different things to different people. To the diamond driller it is resistance to abrasion, to the rotary driller it is resistance to compression, while to the cable-tool driller it is resistance to impact. The three types of hardness—abrasive, compressive, and impact—are conflicting variables for different types of rock.

TABLE 5—RESISTANCE TO COMPRESSION

Material—	Ultimate strength in compression (psi.)
Molded boron carbide	300,000
Dense silicon carbide	82,000
Crystalline alumina	75,000
Optical quartz	58,000
Fused silica	38,000

It should be noted that the relative position of the various materials in Table 5 compare favorably with those under abrasive hardness and to a lesser degree with the relative position of similar materials under impact hardness. The relation between compressive and impact hardness as demonstrated by Bond[11] are given in Table 6.

Table 6 clearly exemplifies the discrepancies existing between compressive and impact hardness. For example, according to the compression tests, shale is the softest rock, while Virginia granite is softer than six limestone specimens but harder than the remaining three limestones. On the other hand, according to impact hardness, shale is harder than granite and in addition is harder than seven out of nine limestone specimens.

If abrasion tests had also been performed on the foregoing specimens, the results would have followed more closely the results of the compression rather than impact tests except that the two granites, which by definition are composed mostly of quartz and feldspar, would have proven harder (abrasive) than all limestone specimens, with the shale the softest of the materials tested.

The ratio of hardness, of silicon carbide to quartz, by the three different methods of measurement, is:

Abrasive hardness 2:1.
Impact hardness 2.7:1.
Compressive hardness 1.4:1.

The existing confusion regarding rock hardness is apparent from the preceding discussion. Each type of drilling procedure has its own definition of the term rock hardness. In the light of present knowledge, it is impossible to correlate the various viewpoints. Current lack of specific data pertaining to the physical properties of rocks is believed to be the major factor contributing to this confusion.

Penetrability

Penetrability of a rock is defined as the rate at which a hole of definite diameter is made in a particular type of rock by a specific type of penetrating medium.

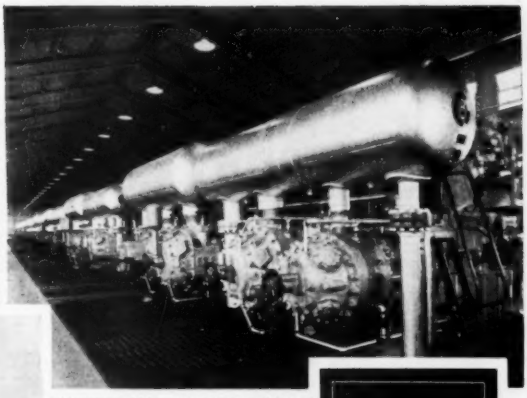
The term penetrability is used here in preference to the term drillability since the former is all-inclusive and implies any method of rock penetration, whether by drill, by flame (jet

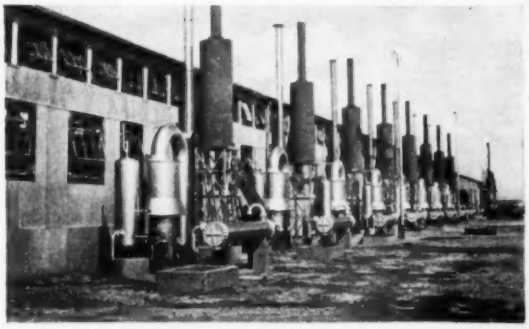
(Continued on page 139)

TABLE 6—RELATION BETWEEN COMPRESSIVE AND IMPACT HARDNESS

		Compressive, psi.		Impact, ft.-lb.	
Material—	State	Maximum	Minimum	Maximum	Average
Limestone (fine)	Michigan	15,450	14,220	12.0	6.09
Limestone (white)	Missouri	10,830	10,285	7.8	6.28
Limestone	Missouri	18,120	16,100	12.1	7.18
Granite	Virginia	17,200	15,020	13.4	11.20
Granite	Georgia	27,600	17,923	14.8	11.42
Limestone	Washington	22,000	16,685	17.5	12.20
Limestone	Wyoming	30,000	27,750	20.5	12.60
Limestone (gray)	Missouri	15,960	14,410	19.7	13.16
Limestone (coarse)	Michigan	19,100	16,785	27.0	14.75
Shale	Pennsylvania	9,100	8,160	22.1	15.06
Limestone	Arkansas	24,480	20,000	33.2	17.91
Limestone	Missouri	23,540	19,222	23.8	18.00

How they lined up efficiency





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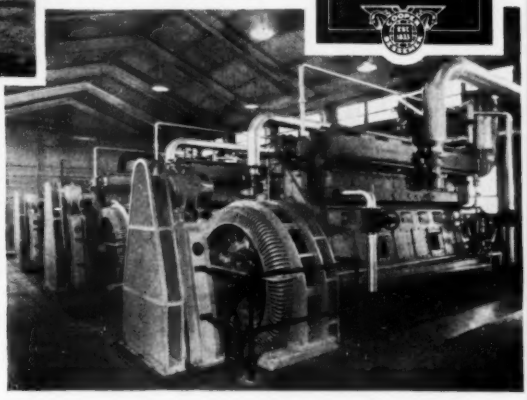

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Sulfur Recovery in Canada

at Shell's Jumping Pound Plant

Facilities designed to produce 30 long tons daily from acid-gas streams

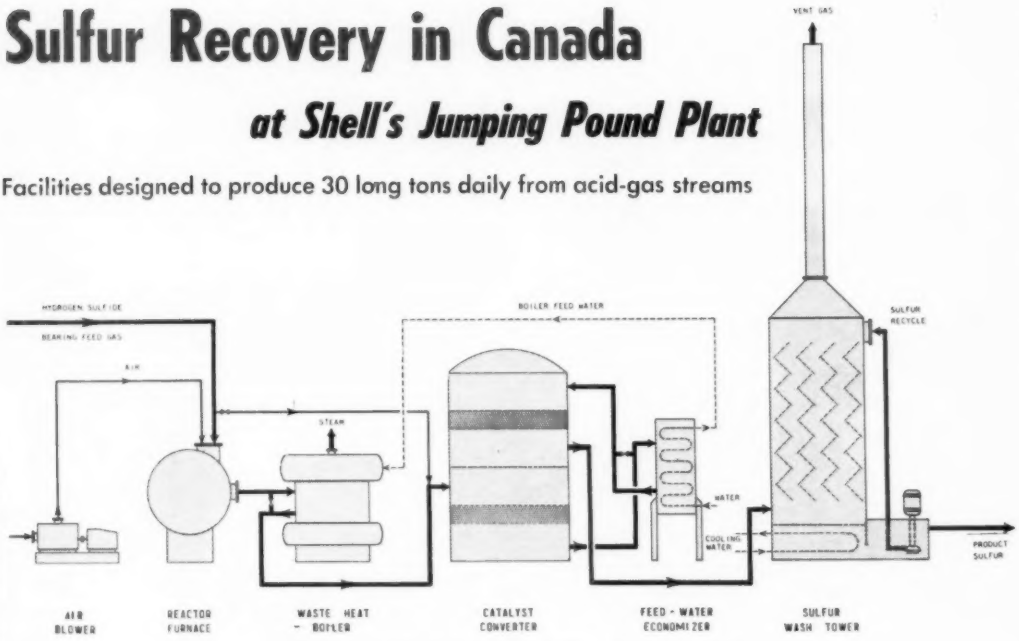

Fig. 1—Flow scheme of new Canadian sulfur-extraction plant.

IN Canada's rapidly expanding petroleum industry, installation of petrochemical and field processing facilities are now beginning to receive increasing attention. In Jumping Pound field 35 miles west of Calgary, Alta., Shell Oil Co. of Canada, Ltd., is constructing a field processing plant for extraction, by the Mathieson process, of 30 long tons of sulfur per day from acid-gas streams produced in treating 30,000,000 cu. ft. per day of natural gas. Sulfur is vital to Canadian industry, particularly in pulp and paper manufacture. Sulfur derived from petroleum-gas treating or refinery operations is of high purity and since it is produced in the elemental form is comparatively easy to stockpile and transport.

The Jumping Pound plant recovers sulfur from waste acid gases handled by the company's recently constructed natural-gas treating plant. This latter unit removes the acidic contaminants (H_2S and CO_2) from approximately 30 million cubic feet per day of natural gas, which is subsequently processed by a gasoline plant and dehydration unit before being piped to the city of Calgary for industrial and domestic utilization.

A simplified flow diagram of the sulfur plant is given in Fig. 1. The acid-gas feed stream to the unit originates at the gas-treating plant, which is not shown on the flow diagram. The feed gas will be available at about 100° F. and 5 psig., and will have approximately the following composition:

	Per cent
H_2S	33
CO_2	59
H_2O	6
CH_4	2

Reactor furnace.—The H_2S-bearing feed gas enters the top of this specially designed furnace. Partial combustion occurs through the admission of a controlled amount of air in sufficient quantity to convert one-third of the total hydrogen sulfide to sulfur dioxide and water, and all of the hydrocarbons entering the furnace to CO_2 and water. The principal reaction occurring in this unit is represented by the following equation:

$$H_2S + 3/2\ O_2 = SO_2 + H_2O$$

This reaction and the hydrocarbon combustion reactions are highly exothermic, and a temperature up to about 1,900° F. may be attained in the gas leaving the furnace.

Secondary reactions which may occur in the furnace are the direct combustion of H_2S to sulfur by the following reaction:

$$H_2S + 1/2\ O_2 = H_2O + S$$

and the reaction of sulfur dioxide with unburned H_2S as follows:

$$2H_2S + SO_2 = 3S + 2H_2O$$

The various sulfur compounds may also undergo side reactions in the furnace with the hydrocarbons and carbon dioxide to form small amounts of carbon oxysulfide and carbon disulfide. These compounds are catalytically converted to elemental sulfur in subsequent stages of the process.

Waste-heat boiler.—Here combustion gases from the furnace are cooled to a suitable conversion temperature with the attendant generation of approximately 7,000 lb. per hour of steam. Up to two-thirds of the feed gas stream may be bypassed around the furnace and waste-heat boiler. However, enough air is always provided to burn one-third of the total H_2S to SO_2 and water. Bypassing, therefore, results in more complete combustion of the portion which does pass through the furnace. This allows some control to be exercised over the temperature and volume of gases entering the boiler from the furnace.

A second bypass is provided around the boiler to permit the passage of combustion gases from the furnace directly into the first converter, so that the temperature in this unit may be satisfactorily controlled.

Catalytic conversion.—The combined gas from the boiler and bypass streams is introduced into the converter, where it passes through the first catalyst bed. Aluminum oxide or natural bauxite catalysts are used for this process, as these have been found to possess high activity and

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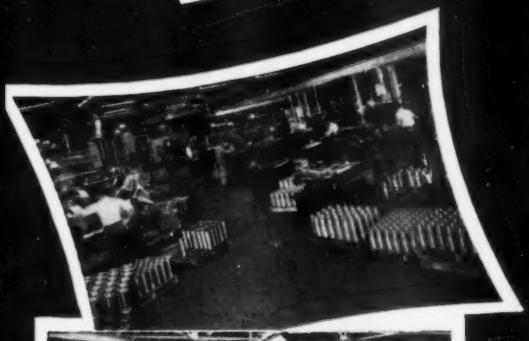

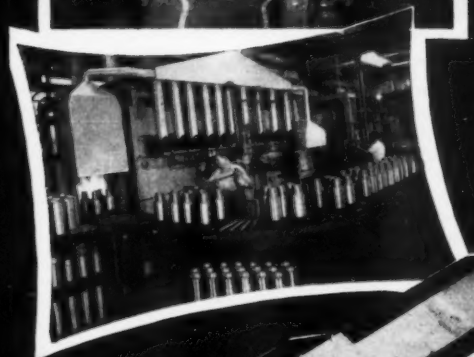

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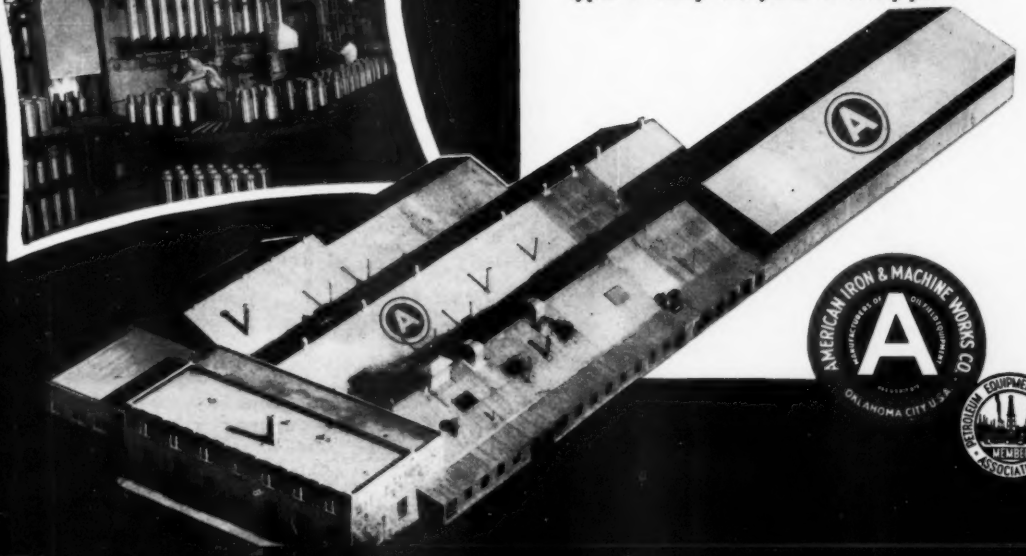

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1. Manual operator may be used to override automatic operation, either to close or open valve at operator's discretion.
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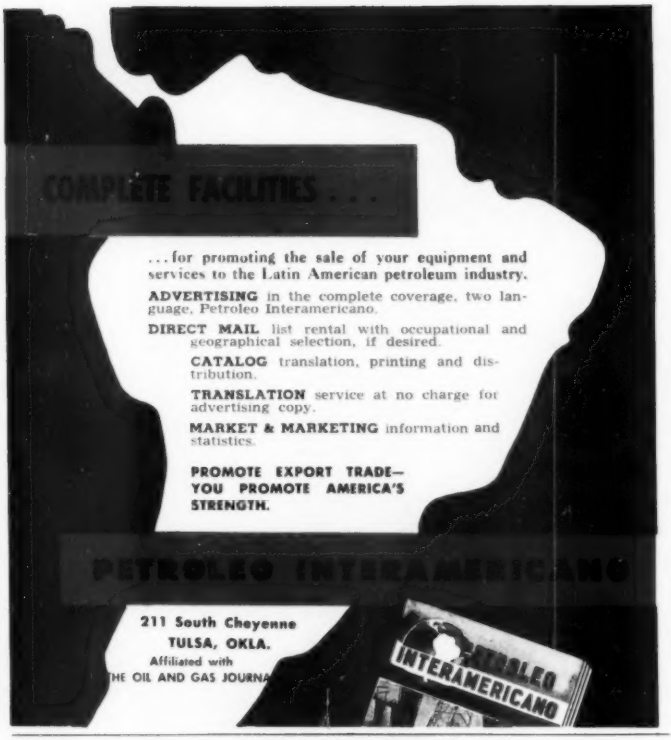
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long life. The first bed is operated at a relatively high temperature in order to eliminate undesirable side reaction products which have formed in the furnace. A considerable portion of the sulfur is formed in the first catalyst bed, and as the reaction of H_2S and SO_2 is exothermic, the gas temperature increases on passing through the converter. All of the sulfur remains in the vapor state at this point.

Hot gases from the first catalyst bed pass into the boiler feed-water economizer, in which they are cooled to the optimum conversion temperature before passing into the second bed. A bypass around the economizer permits temperature control at this point. The second catalyst bed is operated at approximately 500° F., at which temperature a maximum sulfur conversion is obtained without the deposition of liquid sulfur on the catalyst.

Condensation. — From the second catalyst bed the gases enter the bottom of a sulfur wash tower, in which they are contacted with cooled liquid sulfur to condense and cool the product. The liquid sulfur falling to the bottom of the wash tower is cooled to approximately 270° F. by water in cooling coils. Cooled sulfur is recycled over the tower, and the excess, representing the sulfur production, is drawn off to storage.

The sulfur which is recycled over the tower passes countercurrently to the gas stream, and cools the gas efficiently while acting as a collecting medium for sulfur which condenses. The vapor pressure of sulfur is extremely small at the gas outlet temperature, and essentially all of the elemental sulfur vapor is condensed in the tower. The exit gas which is vented to the atmosphere consists primarily of nitrogen, carbon dioxide, and water vapor with a small amount of unconverted sulfur compounds and the trace of elemental sulfur which is not collected in the wash tower.

The product sulfur appears as buildup in the sulfur wash-tower basin. This overflows, and is transferred by gravity flow to the sulfur run-down pit. Daily production can be estimated by gaging the sulfur in this pit, which is kept in a molten condition by submerged steam coils.

Storage and shipment.—Liquid sulfur from the pit is generally piped to large vats for storage as the solid. The liquid sulfur is distributed in a thin layer on the top of sulfur which has already solidified in the vat. After the desired depth of sulfur is reached, the thin sheet metal walls are stripped off the solid sulfur, leaving a large block of pure sulfur.

When it is desired to ship bulk sulfur, shot holes are drilled in the block and sulfur is blasted off one face. Because of its friable nature, the resulting breakage is normally sufficient for handling. The use of a skip loader is planned for loading the sulfur on trucks at Jumping Pound. Care

must be exercised in blasting and handling solid sulfur, because of its inflammable nature and the explosive property of sulfur dust in air.

Under some conditions it is advantageous to ship the sulfur in the molten state, thus eliminating the necessity for solid-sulfur storage and handling facilities at both the producer and consumer terminals. This procedure is particularly adaptable to plants making sulfur from hydrogen sulfide if a continuous nearby market for the sulfur production is available. The Hancock Chemical Co. sulfur plant in Los Angeles is reportedly shipping liquid sulfur to a nearby acid plant in insulated tank trucks, and several other manufacturers use insulated railroad tank cars *(The Oil and Gas Journal, August 23, 1950, page 130)*.

Running the plant. — The actual operation of a plant of this type is extremely simple, and can be handled by one operator. However, the characteristics of the product and the process make it necessary to exercise certain precautions.

The handling of liquid sulfur requires careful control. Its melting point is 239° F., but at 320° it becomes dark brown and very viscous, regaining its mobility at still higher temperatures. It is obvious that adequate provisions must be made to prevent the solidification of sulfur in any of the lines or vessels, and to melt it out if this should occur. This is accomplished by steam tracing or jacketing and insulating all sulfur lines and providing for auxiliary gas burners to heat the major pieces of equipment.

After a prolonged shutdown, the auxiliary gas burners are installed through special ports provided for this purpose and used to bring the combustion furnace and other pieces of equipment up to operating temperature. If the catalyst beds are not at a sufficiently high temperature when the sulfur gases are admitted to the system, deposition of elemental sulfur may occur on catalyst, greatly reducing its activity and necessitating a prolonged reactivation. Care must also be used in designing all sulfur lines to drain completely of sulfur in the event of a shutdown.

Principal control of the process is maintained by analyzing gas off the final converter. Theoretically, the hydrogen sulfide and sulfur dioxide should be present in the gas stream in the ratio of 2 mols H_2S per mol SO_2. However, in actual practice, a slight excess of air is used so that essentially all of the unconverted sulfur leaving the plant will be in the form of the less noxious SO_2. A modified Tutweiler analysis is used for control, in which an initial titration with standard iodine solution indicates the total quantity of H_2S plus SO_2 present in the gas, and a subsequent titration of the resulting solution with standard acid gives an indication of the relative quantities of the two acid gases which were present.

Steam generated in the waste-heat boiler of the sulfur plant is utilized for powering the air blower, sulfur pumps, and other equipment, and is also used to provide heat for jacketed liquid sulfur lines and for the run-down pit heating coils.

Sulfur produced from hydrogen sulfide by this process is extremely pure, and has considerably less ash than the mined material. Because of this, the product can be burned without the formation of a crust. Analyses indicate a purity of better than 99.9 per cent.

The Shell Jumping Pound sulfur plant is being constructed by Fluor Corp., Ltd., based upon process design improvements and plant know-how developed by Mathieson Chemical Corp. as a result of its research and plant operations at the McKamie and Macedonia, Ark., sulfur plants. The plant will not only render the invaluable service of providing a source of pure elemental sulfur in western Canada, but will also serve to eliminate the nuisance which would result from the flaring of the gas-treating-plant acid gases.

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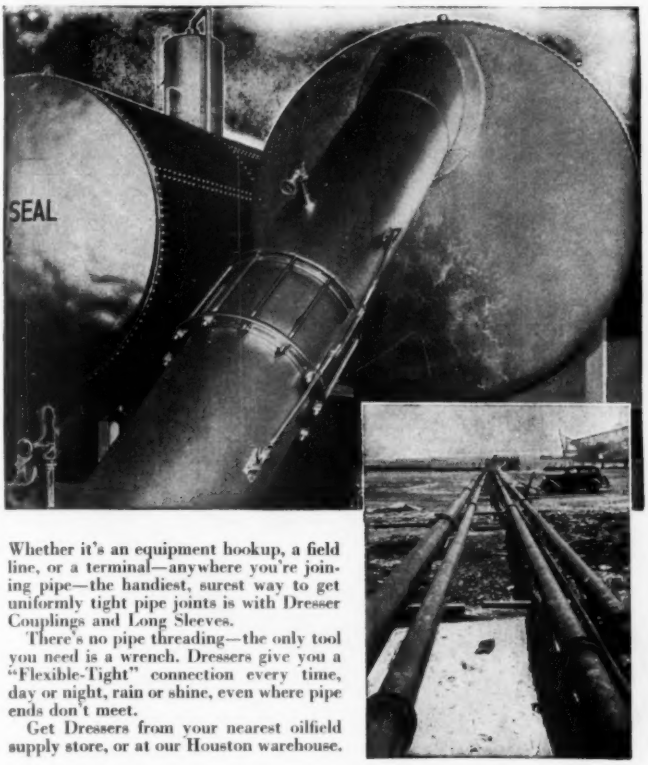

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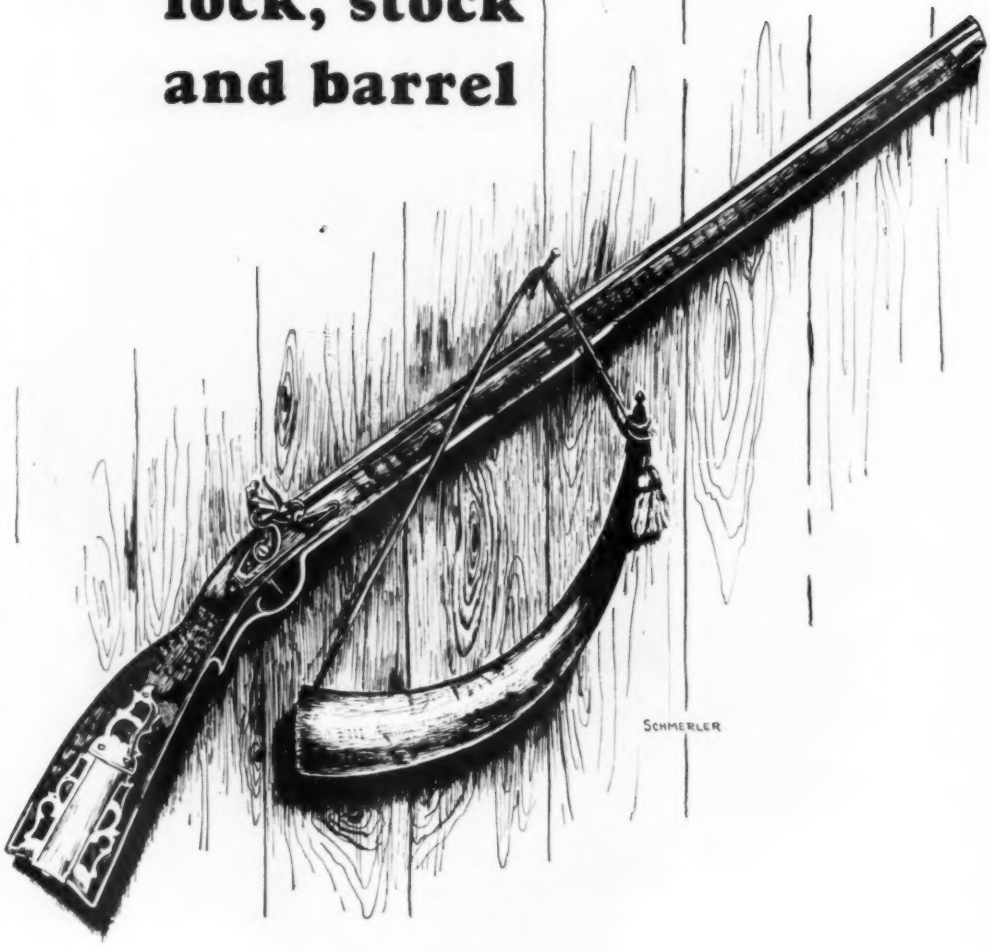

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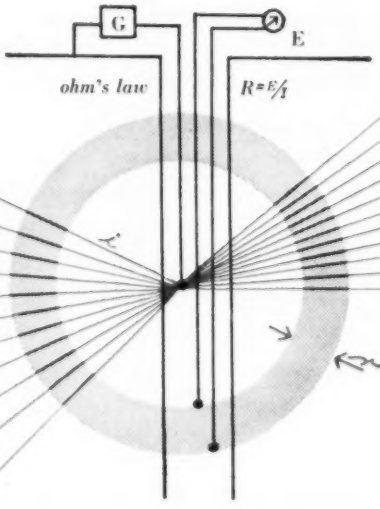

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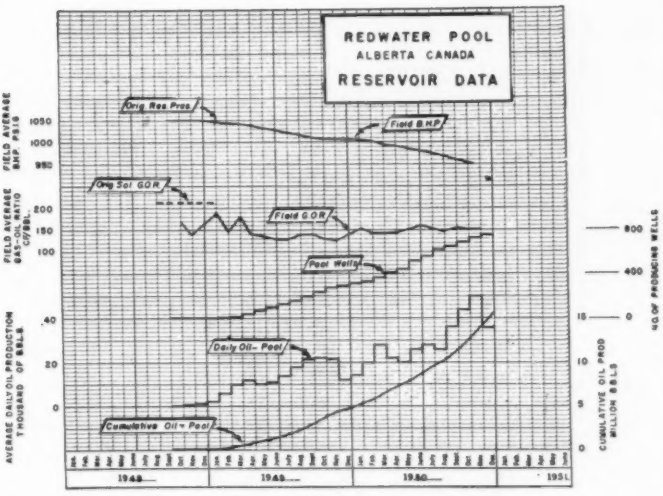

Fig. 1.

Reservoir Analysis Of Redwater Pool

Complete Step-by-Step Procedure

PART 2, CONCLUSION

Recovery · Water Drive · Analyzer · Pressure Maintenance

by Irene Haskett*

THE total area included in the estimated productive outline of Redwater field is about 37,000 acres. From the structural contour map, a total rock volume of 3,463,000 acre-ft. was determined, and, from the isopach map, total void space was found to be 213,390 acre-ft. The average oil zone thickness is, therefore, 93.6 ft. and the average porosity is 6.16 per cent.

The original oil in place was calculated as follows:

Barrels per acre-ft.	7,758
Pore volume:	
Acre-ft.	213,390
Barrels	1,655,480,000
Hydrocarbon volume (connate water, 15%)	1,407,200,000
Stock-tank oil in place (shrinkage, 0.883)	1,242,600,000

The pool has an average of 359 bbl. of stock-tank oil in place per acre-foot, and 33,600 bbl. per acre.

A recovery efficiency of 40 per cent has been estimated.† This may be somewhat conservative if the field is produced entirely by water, but very little is known about flushing efficiencies for this type of reservoir. Either laboratory flooding tests for the various types of porosity must be combined with a pore-size distribution study, or the rise of the water table must be observed over a several-year period before total recovery by water displacement can be accurately predicted. If the reservoir should fall below saturation pressure, a recovery of less than 40 per cent might be obtained with the resulting solution gas drive.

The total recoverable stock-tank oil, using the above assumption, is 497,000,000 bbl., an average for the reservoir of 144 bbl. per acre-ft. With the high effective permeability existing, it is probable that the water table will rise evenly throughout the field. As a consequence, drainage, from high to low-porosity areas will occur to the extent that all sections of the field will have an ultimate production of oil per acre-foot equal to the average value for the reservoir.

*Imperial Oil, Limited, Calgary, Alta.
Paper presented at 1951 meeting of Canadian Institute of Mining and Metallurgy (published in Institute's Transactions, Vol. LIV).

†Subsequent to the original publication of this paper, this estimate of recovery has been revised upwards to 50 per cent.

Pressure-Production History

By August 1, 1951, a cumulative volume of 27,816,000 bbl. of stock-tank oil, or 2¼ per cent of the oil in place, had been produced. It is estimated that at this time the volumetric average pressure of the reservoir was approximately 850 psig., a decline of 200 lb. from the original value of 1,050 psig.

A summary of pressure-production statistics is shown graphically in Fig. 1. Although no accurate figures are available, the water production to date has comprised a negligible portion of the total withdrawals.

During the early life of the field, bottom-hole pressures were taken on an almost continuous basis, and no field-wide surveys were made in a short enough time period that the average reservoir pressure could be considered constant. This practice, and the large proportion of undeveloped acreage, made it impossible to construct accurate isobaric maps.

To determine the average pressure decline of the reservoir, the field was divided into nine areas, and the volume of void space for each determined from the isopach map. All pressures measured were plotted by areas, and average pressure versus time curves were drawn.

The early portion of the curves for areas in which there were no wells during the first year or year and a half were estimated from the pressure differentials apparently existing in various parts of the field, and from the first pressures measured when development was started. The average group pressures for various times were then taken from the curves, and were combined with the oil-in-place values to obtain the weighted volumetric average reservoir pressure.

With more complete development, it has been possible to construct isobaric maps, and the pressure distributions for November 15, 1950, are shown in Fig. 2. These maps were made from field-wide pressure surveys taken over about 1-month periods. All pressures were adjusted to the same date by using the average rate of decline for various portions of the field.

In general, good pressure communication has been evident throughout the reservoir. The first pressure measured for the Imperial Simmons No. 1 well, completed almost 3 miles from the nearest production in October 1949, was 1,017 psig., a drop of 33 psi.

from the original value, and only 10 psi. higher than pressures in the Amelia area at that time.

Evidence of poorer communication is shown by pressure measurements in the northwest portion of the field. There has been little tendency for these pressures to equalize either within this portion or with the remainder of the field, and the latest survey shows an increase in the pressure differentials. This behavior may be due to the incomplete development in this area and to the possibility that a smaller proportion of the oil in place is being withdrawn, with the lesser permeability preventing drainage to lower pressure areas.

Recovery Mechanism

A natural water drive has been the predominant recovery mechanism for the field to date, with about 94 per cent of the cumulative withdrawals having been replaced by the water influx. The average production per pound drop in pressure to August 1, 1951, has been about 139,000 stock-tank barrels, or 157,000 bbl. of reservoir volume. The expansibility of the total oil volume, determined from the compressibility of the reservoir fluid, is only about 10,000 bbl. per pound drop in pressure.

The principal source of the water drive is the expansion of water in the Redwater reef and the fragmental limestone immediately under the reef, these two zones having an average total thickness of about 1,100 ft. Some additional energy is possibly supplied by expansion of the formation rock, and compaction of the overlying shale.

The fragmental limestone has been found to be porous and permeable in about 50 per cent of the wells drilled outside of areas where D-3 reefs are present. Therefore, limited pressure communication probably exists throughout this zone, and later in the life of the pool this formation would be expected to contribute to the water drive at Redwater.

The Morinville reef might also have some effect due to the probable connection through the fragmental limestone, even though no reefal connection exists. However, the large distance of this reef from the productive zone would delay and minimize any water drive from this source. Pressures measured in the Waybrook No. 1 well should aid in future determinations of the effect of this reef on Redwater.

Several aspects of the water drive at Redwater are unusual. The area of the pool is almost one-fifth of the total aquifer area, if only the main Redwater reef is considered, but the average oil-zone thickness is less than one-tenth the total formation thickness. Therefore, not only is the pool completely underlain by water, but about 20 per cent of the total volume of water available for expansion lies directly beneath the oil zone.

In addition, the shape of the reef presents a unique problem in the

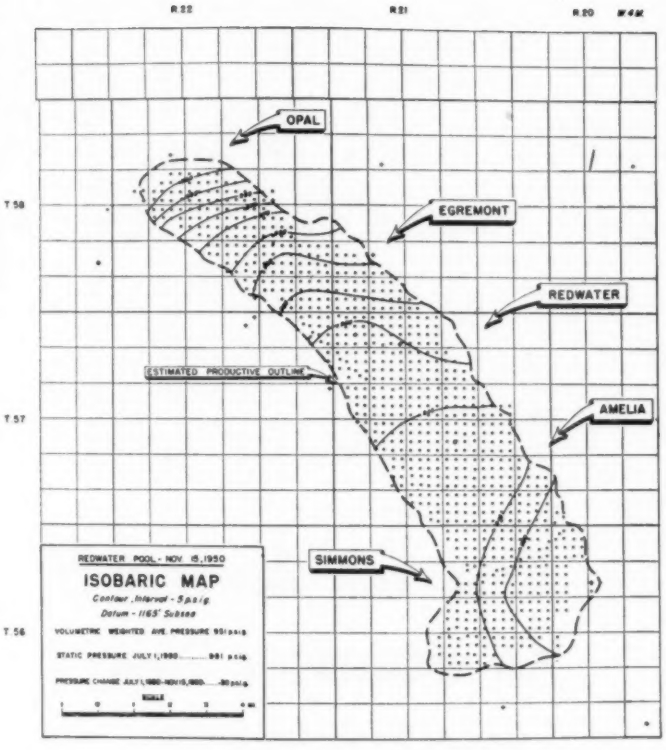

Fig. 2

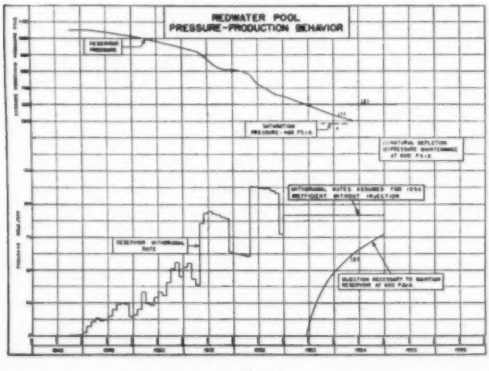

Fig. 3

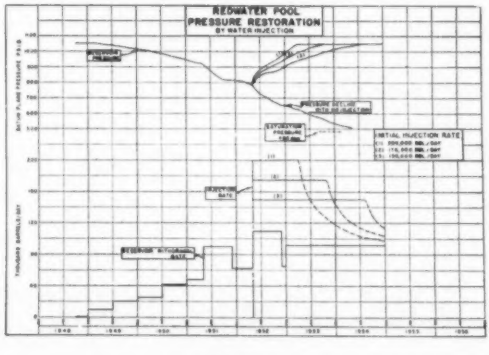

Fig. 4

AFTER ALL, IT'S ONLY MONEY!

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When and how is such a "controlled" reservoir performance program established? Soon after the completion of key wells – *before pressure decline has a chance to permanently alter reservoir fluid basic characteristics* – Core Lab will perform its Well Sampling Service by collecting a sample of the reservoir fluid at the bottom of the hole (or at the separator, if desired). This sample is then transported, under pressure, without loss of gas or oil to Core Lab's extensive Bottom-Hole Laboratory.

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Barrel for barrel, dollar for dollar, the direct earning power of a Core Lab Reservoir Fluid Analysis Report can be greater than any other service performed throughout the history of any given field.

If it's worth producing,
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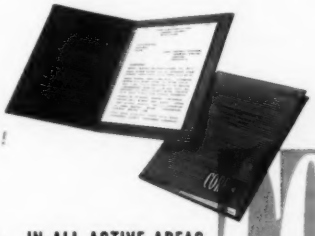
about Reservoir Fluid Analysis!



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analysis of water flow from aquifer to pool. While it may be considered as a radial flow problem, by comparing the reef to a section of a cylinder, it is one of diverging flow, with the productive zone being along the outer circumference, and the volume of the aquifer decreasing with distance from the pool. In most water drive fields, the flow is convergent.

Although an accurate prediction of the behavior of any water-drive pool is a difficult mathematical problem involving the unsteady state equations of fluid flow, it is possible from simplified calculations to obtain some indication of the magnitude of the water drive to be expected.

Assuming the same porosity as exists in the field, the total volume of water in the Redwater reef is approximately 100 million barrels. With an estimated compressibility of brine of 3.0×10^{-6} bbl. bbl./psi., the total expansibility of this volume is about 300,000 bbl. per pound drop in pressure. Therefore, if the entire reef dropped uniformly in pressure, the total expansion from the original pressure of 1,050 psig. to the saturation pressure of the oil, 485 psig., would be only about 170 million barrels, or enough to produce less than one-third of the recoverable oil in the field.

In most cases, however, it has been found that an apparent compressibility considerably larger than the value for water must be used in order to explain the behavior of an aquifer, probably due to other factors such as rock expansion and shale compaction. Therefore, if the pool were produced at low enough rates to allow time for almost complete pressure equalization throughout the Redwater reef, and to obtain a maximum effect from the fragmental limestone and the Morinville reef, it might be possible to produce the major portion of the reserves with the natural water drive.

At any reasonable and economic rates of production, however, a pressure sink will occur in the productive area, and a large pressure differential would be expected to develop across the reef. The resulting water influx is then only a portion of that which would occur if the total amount of energy available from expansion in the aquifer were utilized.

The past pressure-production history of Redwater may be used to obtain a better general indication of future behavior. With production rates which have been very low for the size of the reserve, the water drive has been sufficient to produce an average of 139,000 bbl. per psi. drop. From July 1, 1950, to February 1, 1951, a period of fairly constant production rates, the average production was about 175,000 bbl. per pound. Assuming the latter figure would represent an average production subsequent to this time, the reservoir would drop to saturation pressure after a cumulative production of about 95 million stock-tank barrels of oil, or approximately 7.5 per cent of the oil in place. This may be considered a minimum value, since, with a further decline in reservoir pressure, greater differentials would develop across the reef and an increase in the rate of water influx would be anticipated.

From the above calculations, it may be concluded that the natural water drive will not be of a sufficient magnitude to maintain the reservoir above saturation pressure, and that, unless a program of artificial pressure maintenance is initiated, the pool will be produced principally by a solution gas drive. Increasing gas-oil ratios, high draw-down pressures, and excessive water coning would then characterize individual well production, and the over-all recovery efficiency would be further reduced by shrinkage and by a large increase in the viscosity of the reservoir fluid. Depletion in this manner would, therefore, be expected to result in a much lower ultimate recovery.

Future Reservoir Behavior

Production rates which have been assumed for the future may be summarized as follows:

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	1951	1952-1954
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Total yearly prod., S.T. bbl.	24,000,000	29,700,000
Max. well prod. rate, S.T. bbl./day	93	111
Field depletion rate, per cent/year	4.8	6.0

These rates are much higher than any at which the pool has yet been produced. However, they do not exceed a depletion rate which is considered efficient for a pool of this type, if the reservoir is maintained above the saturation pressure by either a natural water drive or artificial pressure maintenance. Nor are individual well rates high enough to cause damage due to high-pressure draw downs and excess water production due to coning.

In order to predict accurately the effect of these withdrawal rates on the average reservoir pressure, a study was made with the Carter oil-pool analyzer.[2] This instrument, developed especially for analysis of water-drive reservoirs, makes use of an analogy between electrical and fluid-flow equations.

Electrical resistance and capacitance units are used to represent the flow resistance and expansibility of various portions of the formation, and any aquifer configuration may be considered by a proper choice of values. Voltage and currents throughout the circuit are proportional to pressure and rates of flow in the fluid system. Trial-and-error adjustments are made until the voltage of the unit representing the pool follows the pressure history of the pool when currents proportional to past production rates are withdrawn. Predictions are then made by recording the voltage decline when assumed future production rates are considered.

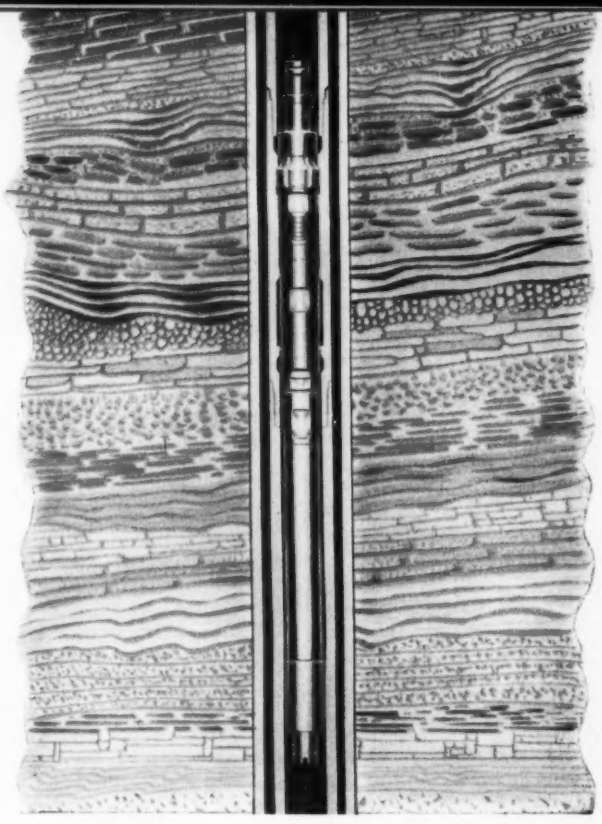
Natural Depletion

A prediction of the natural pressure decline for Redwater pool is shown in Fig. 3, together with the monthly reservoir withdrawal rates which have been assumed. With only the natural water drive as the recovery mechanism, the pressure at the datum plane would fall to 530 psig. by the end of 1953. At this time, the fluid at the top of the producing zone, some 125 ft. higher, would be at the saturation pressure, and any further pressure decline would result in the release of gas from solution. Production rates would then have to be decreased in order to utilize to the greatest advantage the partial natural water drive, and to obtain as large an ultimate recovery as possible with the solution gas drive which would result.

Pressure Maintenance

A greater ultimate recovery will be obtained, and the higher rates of production can be continued, if an artificial pressure-maintenance system is installed to prevent the reservoir from dropping below the saturation pressure. The conditions existing in the aquifer are ideal for the injection of water, either directly beneath the field, considerably below the wa-

(Continued on page 140)



BOTTOM-HOLE HEATER

Otis Removable Bottom-Hole Regulators choke back well pressures at a point deep in the tubing string—where the sub-surface temperature is high. By moving the point of pressure reduction from the surface to the bottom of the hole, the tubing can be used as a sub-surface heating unit to reheat the gas after expansion—before it reaches the surface. Thus the costly installation and maintenance of heaters for surface connections can be dispensed with entirely. Too, Otis Regulators afford all the advantages of bottom-hole choking, automatically reduce the flowing pressure to safe, workable limits at the surface, and allow a controlled rate of production, regardless of the rate of withdrawal. For more than ten years, operators have also used Otis Bottom-Hole Regulators as a means of equalizing gas/oil ratios, to reduce water encroachment by maintaining a constant bottom-hole pressure, as a sub-surface separator to reduce emulsifying, to control high pressures during plugging and well killing operations, and in gas-lift wells. Contact your nearest Otis office for complete details on the many advantages of this versatile tool. There is no obligation, and afterwards you will be better informed on better production practices for your high-pressure wells.

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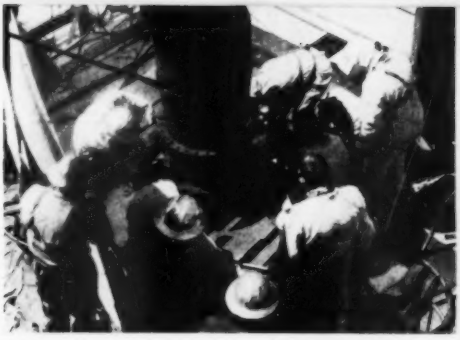
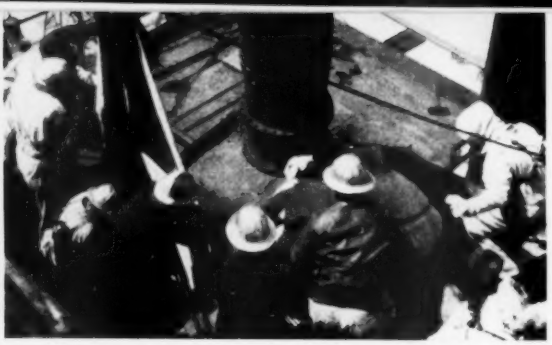
Otis Removable Bottom-Hole Regulators



Bolts in lower flange and most of those in upper flange are removed in preparation for next step.



Blind is inserted between valve and vessel flanges. Piping with valve attached is raised to give clearance

Blind is bolted to vessel flange and remaining bolts in valve's upper flange are removed. Valve is then taken out of the line.

Replacement valve is moved into position and job completed by following previous steps in reverse order. Note hook bolts for blind.

Butterfly Valve Installed While Unit Remains on Stream

REPLACEMENT of a ½-ton butterfly valve in a flue-gas exhaust stack was successfully completed in duplicate at Cities Service Refining Corp.'s Lake Charles, La., refinery while the unit remained on stream.

Maintenance crews were called on to replace an eroded butterfly-type valve operating to control flue-gas rate in catalytic cracking unit "B" at Cities Service. The valve also maintains a back pressure on the regenerator and thus has a direct effect on operation of the entire unit. The on-stream replacement of the eroded valve proved so successful that the crew proceeded to repeat the performance on a second stack at the "B" unit.

Key to success of the operation was the insertion of a metallic disk between valve and stack to cut off flow of flue gas during changeover. Pressure was lowered as far as possible, while maintaining full operation of the cracker, and crewmen proceeded to remove flange bolts connecting valve to exhaust outlet. The valve was lifted by raising piping on the upper side of the valve, and the metal blind was then inserted. The blind was fastened with J-bolts.

After the replacement valve was attached to the upper stack section, the valve was lowered until almost in position, the blind was quickly removed, and the valve flanged up

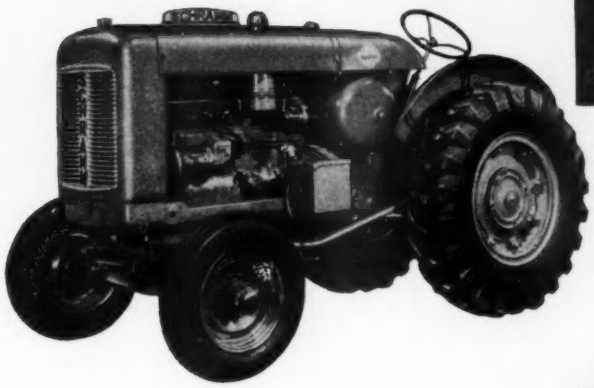
New valve is first bolted to pipe flange, then blind is removed. Wire lines running through bolt hole in blind aid in its removal.

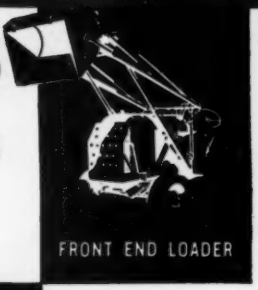
Connecting valve's lower flange to vessel flange completes the job. Stops on lower side of blind assist in centering it.

SAVE MAN-HOURS

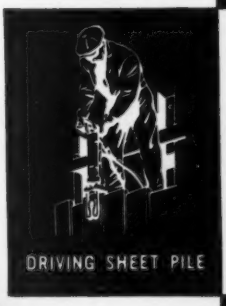
while doing these important construction jobs with the

SCHRAMM Pneumatractor





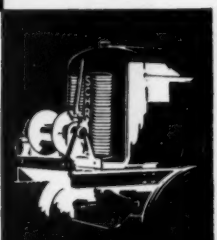
FRONT END LOADER



DRIVING SHEET PILE

DRILLING

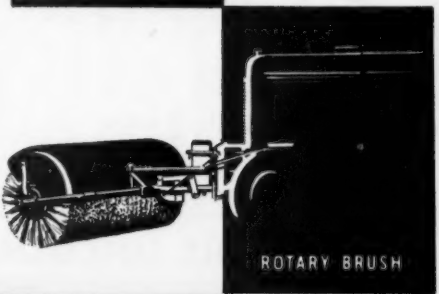
SPRAY PAINTING



FRONT WINCH

CONCRETE BREAKING

EARTH SPADING



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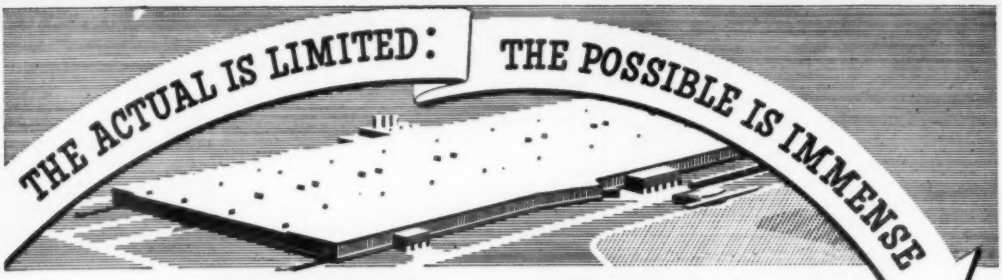

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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Fig. 3—Fabricates tank *with conventional work-handling equipment used for hand welding. Welding speed is 20 inches per minute.*

Fig. 4—Ideal in confined areas *to provide easy, low cost method for applying speed and penetration of hidden-arc welding on jobs formerly restricted to hand welding.*

BOOSTS WELDING SPEED 4 TIMES

..for faster, lower cost fabrication

LINCOLN'S automatic hidden-arc welding with granular flux, long used for double jointing, now fabricates all types of processing equipment for less cost. Utilizing the high current density and deep penetration obtained by concentrating up to 600 amps on a 3/64" wire, welding speeds are being increased 2 to 4 times with joint preparation almost entirely eliminated on plates up to ¾".

"Manual Lincolnweld" combines the benefits of hidden-arc welding with the flexible operation of manual welding with coated electrodes. Electrode feed is continuous and automatic and the operator can guide the gun around obstacles or along irregular curves. Granular flux is directed to the joint by the welding gun, enabling stronger, higher quality welds to be produced often in one pass on all flat and near flat work.

Savings up to 50% are reported by fabricators of oil field equipment, along with higher quality of production and improved operating conditions in the shop.

SPEEDS DOUBLE JOINTING

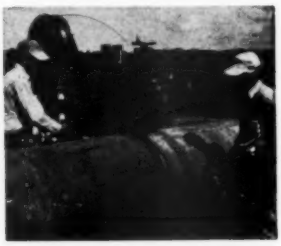

Fig. 1—Double jointing 30" pipe *at welding speeds of 54" to 60" per minute with "Automatic Lincolnweld." Crew of 18 to 24 men completes 8 to 10 joints per hour.*

LAYS PIPE FASTER

Fig. 2—Field welding 30" line *with "Fleetweld" 5 and Lincoln "Shield-Arc" engine driven welders. Joints pressure tested to 800 psi are found free of porosity.*

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124 gpm against a 70′ head.

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SECOND—There are many brands of commercial fluxes on the market which are good and give excellent results. Good results may also be obtained by mixing seven parts of boric acid and three parts of calcined borax.

THIRD—Heat the rod uniformly using a neutral or slightly oxidizing flame. Dip the rod in the flux. Have the section to be welded at a dull red temperature. Melt the heated end of the rod on to the pre-heated section to be welded. The bronze will flow away in an even layer and give a good "tinning" coating which is important. Keep building up this section by melting successive layers of rod, keeping the inner cone of the flame about ¼" away from the puddled surface.

FOURTH—Bronze rods and welds can be burned by overheating. They should not be brought beyond a dull red heat.

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Bronze
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The Welding Rods made by Titan are used for bronze welding cast iron, malleable iron, wrought iron, galvanized iron, steel, brass, bronze. They are scientifically made under strict laboratory control.

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SECOND—Occluded gases held in the cast metal are carried through manufacturing operations unless an exceptionally effective deoxidizer is added before the bronze is cast. These gases prevent the bronze from flowing uniformly, resulting in excessive fuming and porous welds. There are very few deoxidizers that will give constant results and it was only after months of patient research that TITAN metallurgists developed a double deoxidation process which could be depended on to eliminate injurious gases and at the same time produce alloys with excellent bonding properties resulting in welds with great strength and high ductility. All TITAN bronze alloys are deoxidized but only PENN BRONZE, TITAN BRONZE and TITAN MANGANESE BRONZE are doubly deoxidized.

THIRD—*Users of TITAN bronze welding rods are guaranteed maximum uniformity because of the rigid specifications of our testing departments.* Uniformity of mixtures and casting temperatures are essential to quality welding alloys. Strict laboratory control cannot be overemphasized.

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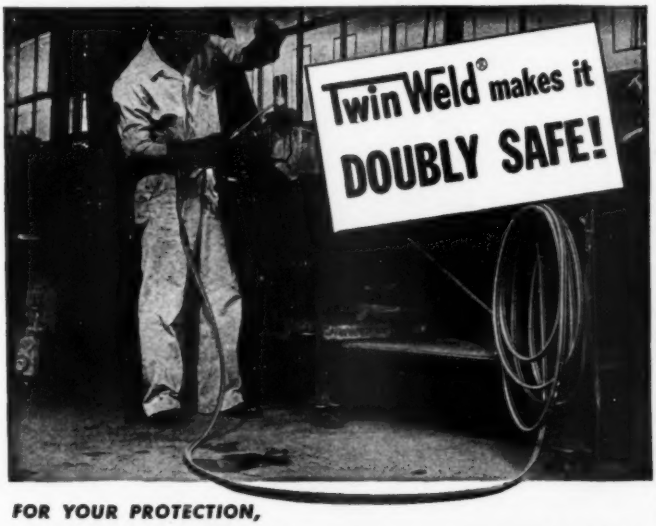
No. 190 Kimball fully insulated welders glove.



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*U. S. Patents 2,122,335 & 2,136,280

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HOLDS THE TWO ENDS OF PIPE TOGETHER WHILE WELDING

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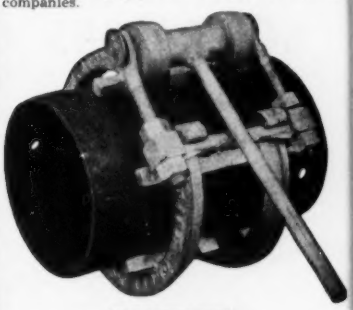

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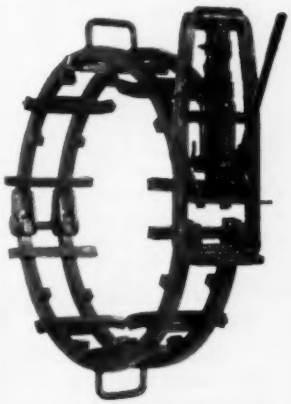

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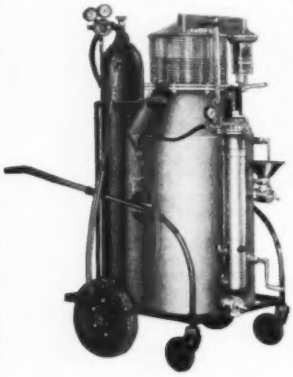

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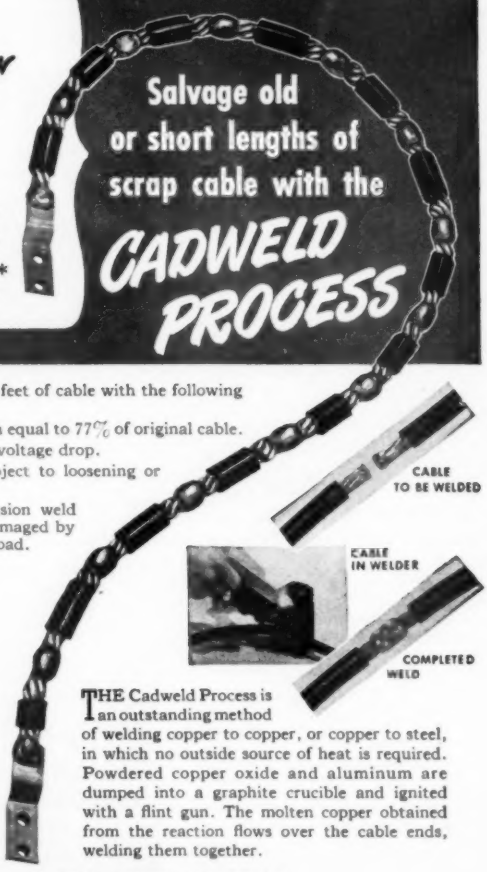

14 connections in 4 feet of cable with the following results:

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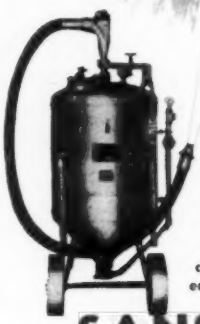

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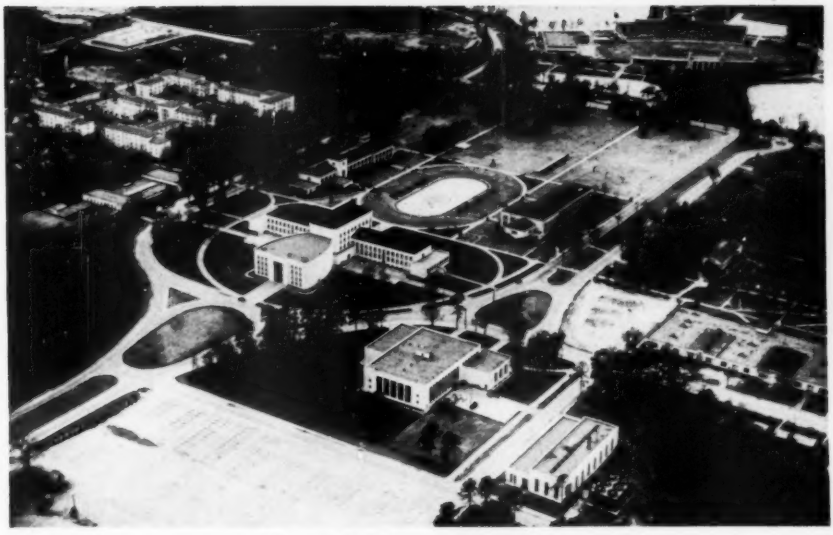


Aerial view of University of Houston campus.

PETROLEUM ENGINEERING SCHOOLS

UNIVERSITY OF HOUSTON

THE University of Houston Petroleum Engineering Department actively began full-time operations in September 1947. In the summer of 1948, three petroleum-engineering graduates received their degrees. In the summer of 1951, 24 petroleum-engineering graduates received their degrees. The present enrollment is upward of 200 students with petroleum-engineering objective.

The petroleum department operates in the College of Engineering (Prof. M. L. Ray, dean) and maintains a close liaison with chemical engineering (Prof. J. R. Crump), and the Department of Geology (Dr. George B. Somers). The petroleum faculty consists of C. V. Kirkpatrick, B.S., associate professor petroleum engineering and chairman of the department, and R. P. Sterk, B.S., as full-time staff members. The part-time faculty consists of men in industry, each having many years' experience in his particular field and all having at least 4 years' university teaching experience. These men are: Park Jones, consultant and reservoir specialist; A. S. Trube, reservoir engineer for Tide Water Associated Oil Co.; T. E. Griffith, of Tide Water Associated Oil Co.; R. P. Akkerman, geologist with Gulf Oil Corp.; B. Q. Green, engineer in charge of Magcobar trainee program.

Salient Facts and Figures

General.—Located at Houston. A coeducational university offering courses in both undergraduate and graduate levels in eight different colleges under the direction of a board of regents established by a special enactment of the Texas Legislature. The university was authorized to operate as a junior college in 1927 and was established as a 4-year institution June 1934.

The university is the second largest in the state with a total enrollment of 14,129 students in the fall of 1950. Of this number 10,503 students were on the main campus and 3,626 enrolled in the downtown school and extension courses.

Buildings and grounds.—The school owns 250 acres. All permanent buildings are of limestone construction, completely air conditioned throughout. This includes five new dormitory buildings that will accommodate 1,025 students. Plans now are under way for construction of a petroleum-engineering building.

Calendar.—The school operates on a semester basis fall, spring, and summer with both day and night classes offered.

Expenses.—Tuition is approximately $375 per year (fall and spring semester).

Curriculum and Courses

The petroleum engineering curriculum offers an intensive 4-year course in petroleum development or production with emphasis upon engineering fundamentals and petroleum geology. The development major stresses mapping of reservoirs, properties and behavior of fluids, and functions of wells and plants in the development of oil and gas fields. The production major stresses drilling of wells, selection and installation of field equipment, and servicing of oil and gas wells. The student selects his preference of production of development in the junior year. Two months' field work is required for graduation and elective hour credit (up to 6 hours) is given for

field work. A total of 150 hours are required for graduation.

Petroleum courses offered with credit hours represented by the middle digit are:

Pet. 331—Introduction to Petroleum Development and Production, a descriptive course covering all phases of the industry.

Pet. 332—Petroleum Development and Production, a quantitative course embracing a study of fundamental development and production problems.

Pet. 333—Development I. A thorough study of the fundamentals of reservoir development problems.

Pet. 334—Subsurface Mapping. Structural and isopachous mapping of sandstone and limestone reservoirs from actual field electric logs.

Pet. 342 — Production I — Equipment — A quantitative problem and laboratory course embracing the design, selection, and installation of oil-field equipment.

Pet. 431—Development II—The application of development fundamentals to various types of gas and condensate reservoirs.

Pet. 432—Development III—The application of development fundamentals to various types of oil reservoirs.

Pet. 433 — Petroleum Laboratory — Mud, core, and oil testing lab.

Pet. 435—Production II—Mud engineering. Fundamentals of drilling mud control with particular emphasis on special drilling fluids.

Pet. 436—Production III—Lifting Methods—Up-to-date analytical coverage of the various means of artificial lift with particular emphasis on gas lift.

Pet. 444—Natural-Gas Engineering—Fundamental gas laws, measurement, gas-well capacities, and pipe-line transportation.

Pet. 500—Research. Hour credit dependent upon the research problem.

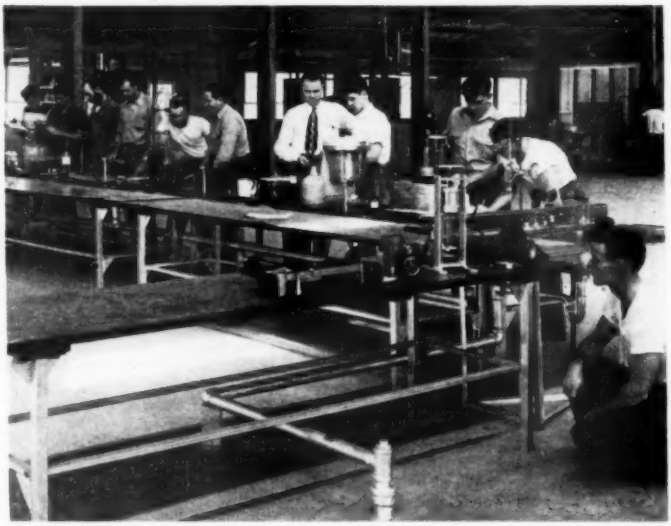
Pet. 532—Petroleum Economics—A study of the legal and economic factors involved in developing and producing oil and gas fields.

Pet. 531—Electric Log Interpretation in Sandstone Reservoirs—A course emphasizing quantitative evaluations from electric logs.

Also, particular emphasis is placed on the night school, the instruction of which is handled largely by the part-time faculty. This emphasis is the outgrowth of a community demand which, in the Houston area, allows many students to work during the day and attend school at night. This program further enables many graduates working in this area to pursue advanced degrees.

C. V. KIRKPATRICK
Chairman, department of petroleum engineering.

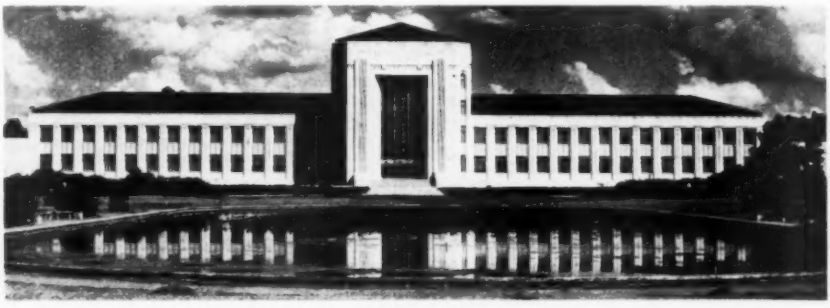
PARK JONES
Professor of petroleum engineering at University of Houston.



Laboratory, showing emulsion breakdown, core extraction, and mud-testing apparatus.

Laboratory Facilities

Complete up-to-date laboratory facilities are available for a thorough study of muds, cores, oil testing, petroleum equipment, and natural gas. A special research section is being set up for long core and quantitative electric-log studies. In addition many laboratory periods are held on a drilling or producing location usually within a 30-minute radius of the school.



Administration Building at University of Houston.

Another NEW Shaffer Advancement . . .

The SHAFFER JAR SAFETY JOINT

***Combines Jar and Safety Joint in ONE tool!**

***Sets new standards of efficiency, simplicity and compactness!**

Unequalled for Formation Testing, Casing Tests, Diamond Core Drilling, Fishing and similar operations!

WHAT it is!

The new Shaffer Jar Safety Joint combines—in ONE compact tool—*both* a straight-pull Jar and a quick-releasing Safety Joint. If the stuck string cannot be jarred loose, it can then be disconnected for recovery of everything above the mandrel of the Jar Safety Joint. Later, by simply using the recovered portion of the Jar Safety Joint at the bottom of the run-in string, the recovered string can be reconnected with the stuck portion for subsequent recovery operations. The tool embodies operating principles already field-proven in other Shaffer products—and has been successfully used by leading operators under a wide range of well conditions.

WHY it's better!

The Shaffer Jar Safety Joint not only combines two tools in one—thus saving extra costs and conserving space in the string—but it also provides greater safety and efficiency than assemblies of conventional single-purpose tools. Only a *single* pack-off is required . . . only *one* pin and *one* box . . . only a few simple parts that operate as a coordinated unit in place of many duplicated parts that cause multiple maintenance and operating problems. These and other advantages outlined at right mean safer, more efficient, and more economical operation!

MANY APPLICATIONS

The Shaffer Jar Safety Joint is particularly recommended for use with formation testers, casing shoe tests and on fishing jobs. And, although not designed for heavy, high-speed drilling operations, it is extensively used for diamond core drilling and similar light drilling operations.

AS A JAR

The tool strikes a powerful upward blow with simply a *straight pull* on the string. *No torque or rotation of any kind is needed to strike the blow* . . . therefore, there is no interference with operation of other tools in the string. However, full torque *can* be placed in the string if desired for loosening operations—but is not necessary to operate the Jar.

- Any number of blows can be struck in rapid succession—or single blows at any desired intervals—by simply raising and lowering the string. Every time the string is lowered the tool automatically "resets." Raising the string strikes the blow—and blows may be struck *continuously* as fast as the string can be raised and lowered.
- Force of the blow is easily adjusted over a range of 10 to 60 tons in 5 ton steps, so that virtually any desired blow can be struck.
- The tripping mechanism does not depend upon friction for operation and strikes a steady, uniform blow.
- All rotational loads are carried by heavy drive keys—not by threads. Since the drive keys are stronger than the run-in string, any amount of torque can be applied to the string—in *either* direction.

Drive keys remain in locking slot as the blow is struck

AS A SAFETY JOINT

. . . this new Shaffer tool is also superior. Since there are no tight-fitting joints or threads to "force," quick release can be effected whenever desired by simply following a few simple operations in proper sequence.

- Only 1/6th turn is needed to release the Safety Joint, eliminating risk of unscrewing other threads in the string.
- Until the Safety Joint is first made ready to release, *any* amount of torque—in *either* direction—can be applied through it without danger of release.
- At any desired time after release, the Safety Joint can be reconnected *in the hole* for further recovery operations.

Rotating drive keys into unlocking slot releases Safety Joint

***Get The Full Details* on this new Shaffer development from your nearest Shaffer representative. Or write direct!**

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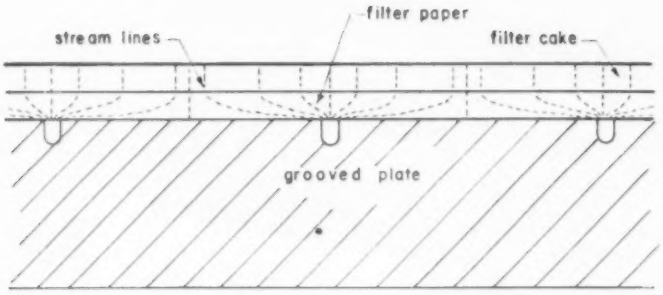

Fig. 1—A flow section of the filter cake, filter paper, and grooved plate.

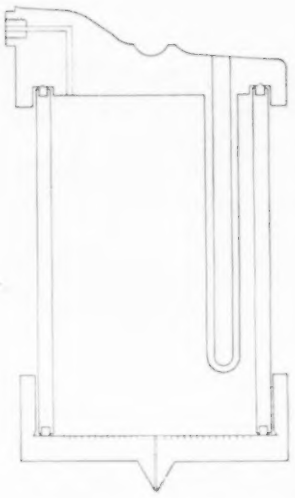

Fig. 2—Longitudinal section of the new filter-loss tester assembly.

The standard A.P.I. tester cannot measure accurately the filter losses of fluids having very low loss. An improved tester is described here, the chief feature of which is a small holdup volume under the filter paper. Besides being more accurate, the improved tester is actually more convenient for both laboratory and field use.

Here's an improved

Drilling-Fluid Filter-Loss Tester

by J. F. Chittum,* M. B. Standing,* and W. T. Cardwell, Jr.*

THE present A.P.I. standard filtration equipment[1] has a space under the filter paper in the bottom of the cell that can hold up a significant volume of filtrate. The actual volume of this space depends upon the distortion of the screen that supports the filter paper; the effective volume depends upon the manner in which the filtrate wets the screen and filter-press bottom. The effective holdup volume can vary from 0.1 to 1.5 cc. According to experience with graphical correction methods, the holdup volume is usually about 1 cc.

When high-filter-loss fluids are measured in the present tester, the holdup volume is unimportant. An unknown variation of a few tenths of 1 cc. makes no practical difference. When low-filter-loss fluids, such as the modern emulsion fluids, are measured, the holdup volume becomes significant. In the field, expensive chemical treatments are sometimes based on variations of 0.10 cc. It is desirable that these observed variations represent real changes in the fluids being measured, not apparent variations due to changing holdup volume.

Finally, when fluids are measured, such as oil-base fluids, and the filter losses are of the order of 1 cc., measurements on the present standard tester have little value. It is impossible to make meaningful comparisons of fluids whose filter losses are in the range below 1 cc.

Low-filter-loss fluids command premium prices, and it therefore seems important to be able to make meaningful measurements of the quantity that serves as one of the main bases for extra cost. There are two ways that ordinary filter-loss measurements can be made more meaningful: (1) Measured values can be corrected for holdup volume, and (2) the filter tester can be designed to make the holdup volume insignificantly small and easily reproducible.

Correction of Filter-Loss Values

There are several accepted methods of making corrections in measured filter-loss values. All are based on the established filtration formula:

$$v = K\,(t)^{1/2}$$

where:

v = filtrate volume
K = constant, dependent on the temperature and pressure
t = time

The object of the correction in each case is to obtain the total filtrate volume which would have been collected in 30 minutes, if the filtrate had started to issue at zero time.[2] Some of the methods are:

1. The filtrate volume-time data are plotted on semisquare root paper. The straight line through the points is extrapolated to zero time. Then the line is given a parallel displacement until it passes through the origin. The corrected value for the 30-minute filtrate volume is read from the displaced curve.[2,3]

2. The volume of the filtrate collected at the end of 7½ minutes is subtracted from the volume at the end of the 30-minute period. The difference in the volumes is doubled to give the corrected volume.

3. The readings of the filtrate volume are taken at the end of 1 minute and at the end of 14 minutes. The first reading is subtracted from the second and the difference is doubled to give the corrected 30-minute volume.

The disadvantages connected with the correction procedures are readily apparent. All of them are inconvenient to use in the field, particularly for rig personnel. They are not useful for fluids of extremely low filter loss, even in the laboratory. To avoid the disadvantages of correc-

*California Research Corp., La Habra, Calif.

Here's how the *new* OBI filter press provides greater accuracy saves valuable time

This new, quality filter press is a compact instrument; easy to operate; requires no wrenches, pliers or special tools to assemble; easy to clean; equipped with special, long lasting, built-in oil resistant gaskets; is more accurate than any other filter press in use today; gives duplication of results, and saves time in the laboratory and in the field. A short test when multiplied by a factor, gives a highly accurate reading for 30 minutes.

hold up volume is only 0.08 c.c.* The greatest single improvement over conventional filter presses is the design of the manganese bronze bottom cap.* Concentric circles and radial lines are machined in the bottom cap so accurately that the hold up volume is only 0.08 ± .03 c.c., as compared with a hold up volume of about 1.0 c.c. normally encountered in present makes of filter presses. An extremely small drainage hole in the bottom cap also reduces the amount of fluid that is retained in the press. The OBI Filter Press is especially useful for measuring muds with low fluid losses.

converts to present methods of evaluation If results as obtained by ordinary filter presses are desired, a monel screen is provided that sits on the top of the grooves in the bottom cap and allows the OBI Filter Press to duplicate the current method of evaluation. Hold up volume with the screen will approximate 1.0 c.c.

method of assembly Place a piece of filter paper on top of the grooves in the *bottom cap*. Twist the *cylinder* into the latch grooves of the *bottom cap*. Fill the *cylinder* with mud to about 1" from the top. Slip the *top cap* over the top of the *cylinder*. Insert this assembly into the *filter press frame*. Tighten (finger tight) the *cell bottom screw* to lock the assembly together. Adjust a graduate cylinder up into the *cell bottom screw* by means of the *elevator plate*. Close the *bleed-off valve*. With the *regulator valve* released, tighten the *capsule holder screw* which breaks the CO_2 capsule that provides the pressure. Adjust the *regulator valve handle* so that the gauge reads 100 p.s.i. The test is now running. At the completion of the test, release the regulator valve screw (which leaves sufficient CO_2 for additional tests with same capsule), open the bleed-off valve and disassemble for filter cake measurement.

*Patents on this feature have been applied for, by California Research Corp. and are licensed to Oil Base, Inc.

the filter press case The lightweight wooden carrying case holds complete equipment for field tests. Plus the press itself, space is provided for two graduate cylinders (5 c.c. and 25 c.c.), two boxes of filter paper (200 sheets), an optional-use monel screen, and 22 CO_2 capsules. Complete instructions accompany each press.

Ganged assemblies of filter presses for laboratory use are available on special request.

OB PRODUCTS

Black Magic	White Magic
OB Gen	Chemical "Y"
OB Gel	Chemical "X"
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tions, a new filter cell was developed that enables satisfactory results to be obtained, without the necessity of corrections, even for fluids of extremely low filter loss.

The New Tester

The filter cell described here has only three separable parts. The top part is essentially like that of the present A.P.I. standard tester. The middle, cylindrical part is of the same over-all dimensions as the corresponding present part. There are, however, slightly tapered channels cut in each end of the cylinder wall into which neoprene gaskets are recessed.

The bottom part of the filter cell has been changed radically.* The plane surface that closes the bottom of the cell, the bottom plate, see Fig. 1, has been made into a filter-paper support by cutting interlacing grooves in it for drainage of the filtrate to the central outlet tube. The groove system in the bottom plate is the device that serves the purpose of decreasing the holdup volume in the new cell.

The cell is assembled by simply placing the filter paper flat on the bottom plate, attaching the cylinder, pouring the fluid into the container thus formed, and placing the top part in position. A longitudinal section through the tester is shown in Fig. 2.

Test Procedure

No special precautions are necessary in carrying out filter-loss tests using the new cell. The procedure described in Section 4 of the Recommended Practice on Standard Field Procedure for Testing Drilling Fluids[1] is followed with only minor changes. The parts of Item 41, which refer to gaskets and wire screen, may be disregarded. It is important to use a good grade of filter paper such as Whatman 50, which is about 0.005 in. thick and which has a permeability of about 0.01 darcy.

*Patent applied for, Licensed to Oil Base, Inc., Compton, Calif.

Test Results

The described filter cell has been in use in our laboratory for about 4 years. It was given completely satisfactory results on a large number of drilling fluids of different types. Sample data for filter-loss determinations, made on each of eight different drilling fluids, are shown in Table 1. Results for each tester, the present A.P.I. standard tester and the new tester, are reported: (1) as obtained uncorrected, (2) corrected by the graphical method, and (3) corrected by doubling the difference between the 14-minute and the 1-minute filtrate volume.

The reproducibility of measurements with the new cell is good. In addition, the uncorrected results agree very well with corrected results from the present standard tester.

Additional filter tests were run on each of four drilling fluids at 150° F. Table 2 compares the uncorrected and the corrected results. The last column of Table 2 shows a different kind of uncorrected result, a calculated 30-minute value, obtained merely by doubling the 7½-minute value. The agreement between this value and the 30-minute value shows that with the new tester, which gives no large errors in the initial minutes of flow, it is possible to make an accurate estimate of the 30-minute value from a short 7½-minute test.

References

1. Standard Field Procedure for Testing Drilling Fluids, A.P.I. Code 29, Third Edition, May 1950.
2. "Methods of Determining the Filtration Characteristics of Drilling Muds," Drilling Mud, Baroid Sales Division 6, May (1938).
3. "Interpreting Filter-Test Results," The Oil and Gas Journal 42, Mar. 9, p. 71 (1944).

TABLE 1—COMPARATIVE WALL-BUILDING TESTS AT 100° F. AND 100 PSI., 30-MINUTE FILTRATE VALUES

	Standard A.P.I. tester*			New filter cell*		
Sample†—	Uncorrected	Corrected graphically by extrapolation	Corrected by doubling (14-1) min. readings	Uncorrected	Corrected graphically by extrapolation	Corrected by doubling (14-1) min. readings
Oil-base drilling fluid	0.0	...	...	0.30	0.30	0.31
Another oil-base drilling fluid	0.0	...	...	0.56	0.59	0.55
Emulsion drilling fluid	1.6	2.0		2.4	2.3	2.3
Lime-starch fluid	4.0	5.0	4.3	4.2	4.2	4.0
Pyro treated native clay fluid	3.5	4.8	4.8	4.3	4.4	4.3
Quebracho treated fluid	4.8	5.5	5.5	5.5	5.5	5.4
C.M.C. treated brine fluid	5.8	6.6	6.5	6.6	7.1	6.8
Another C.M.C. treated brine fluid	6.9	7.9	7.5	8.0	8.7	8.3

*Values in cubic centimeters. †Averages of five tests.

TABLE 2—COMPARATIVE WALL-BUILDING TESTS AT 150° F. AND 100 PSI., 30-MINUTE FILTRATE VALUES USING NEW FILTER CELL

Sample*—	Uncorrected filtrate volume (cc.)	Volume corrected graphically (cc.)	Volume corrected by doubling (14.1) min. readings (cc.)	Volume obtained by doubling (7.5) min. readings (cc.)
Pyro treated native clay fluid	3.6	3.6	3.4	3.5
Starch fluid	4.3	4.3	4.1	4.0
Calcium clay fluid	6.2	6.1	6.2	6.4
Lime starch fluid	12.5	11.9	12.2	11.5

*Averages of five tests.

Drum and transmission assembly of Brewster N-75 Drawworks.

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Brewster's new N-75 compound.

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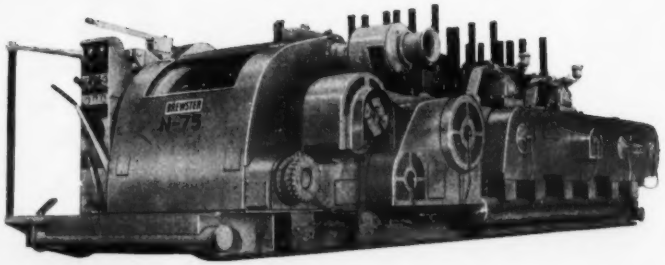

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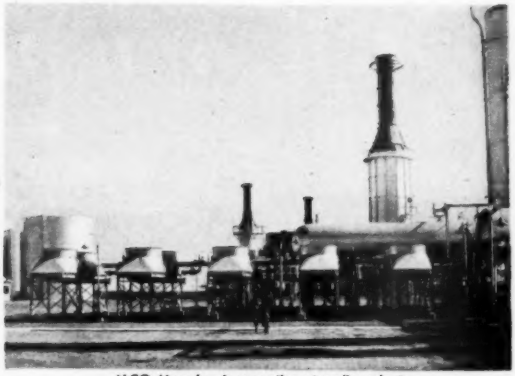
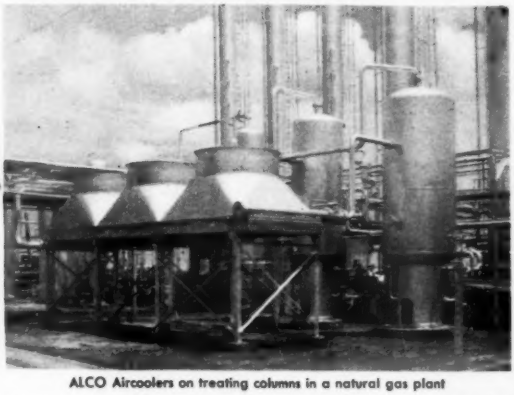
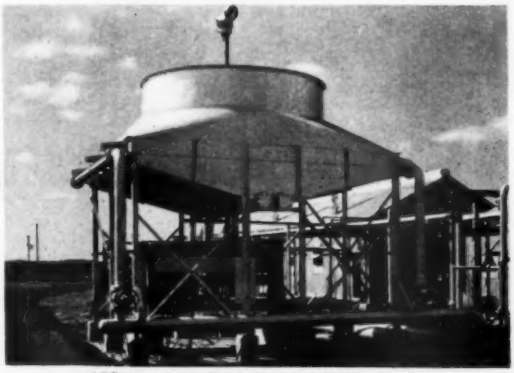


ALCO Aircoolers in operation at cycling plant



ALCO Aircoolers on treating columns in a natural gas plant



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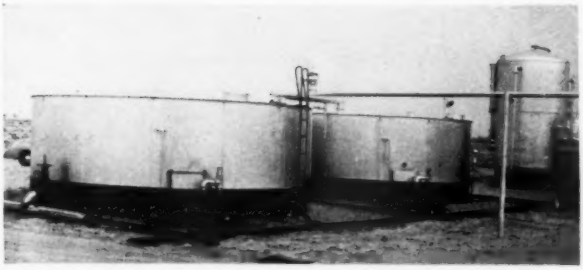
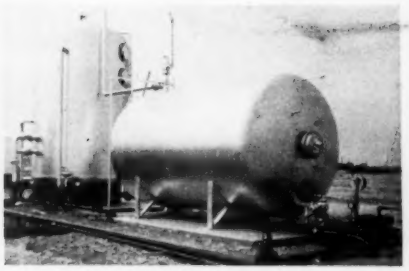
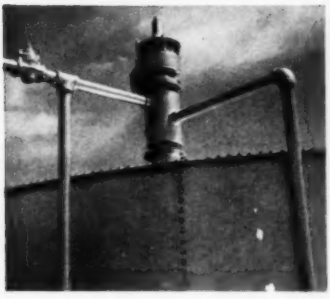


Oil-field brine, released from the wash tank into these vessels, is then run to vertical filters for removal of any entrained solids.

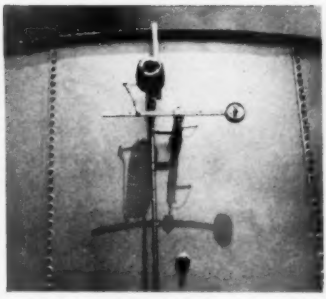


After passing through the filter, background, the brine then enters a horizontal surge tank.

Automatic System at Rio Bravo Features Salt-Water Injection



Filtered brine tanks are equipped with controllers for maintaining pressure on the gas blanket which covers the brine.



Withdrawal of brine from the gas-blanketed storage tanks is regulated by float control which operates motor-driven triplex pumps.

OIL-FIELD-BRINE disposal in Rio Bravo field, Kern County California, is being accomplished sucessfully without any kind of pretreatment. The successful disposition of the brines in this project is due, perhaps to two factors. The first is that the water is separated from the oil as quickly as practicable. Second, the water is never exposed to the atmosphere, so that its original composition and characteristics remain approximately unchanged throughout the cycle. This cycle, from the time water is produced with the oil, from comparatively wet wells, to its final disposition into the original sand, is completed within 24 hours. Therefore, opportunity for chemical conversion, breakdown, or crystal formation is practically eliminated.

Rio Bravo field, northwest of Bakersfield in the San Joaquin Valley, is an anticlinal fold with the axis northwest-southeast, and might be considered an extension of Greeley field, but separated from it by a narrow synclinal saddle. Two separate and distinct sands produce both oil and gas. The top sand was named the Rio Bravo, while the slightly deeper formation is the Vedder. The Rio Bravo ranges from 40 to 105 ft. in thickness but has a mean average of approximately 50 ft. A 12-ft. shale break separates this body from the lower sand which has an average thickness of approximately 200 ft. Shale fingers intrude into the Vedder as thick wedges at the north, but thin to knife edges in the middle of the field. Edge wells and the Vedder wells on the flanks of the structure produce the bulk of the salt water which is subsequently returned to the formation for ultimate disposal.

Production facilities are arranged so that the oil, water, and produced gas dissolved into, or accompanying the oil, flow through a system of gathering lines to separator batteries installed adjacent to nearby oil-treating tanks. The oil and salt water pass through more or less conventionally arranged vessels into a wash tank at each setting for breakdown of any emulsion and separation of water from the pipe-line oil. No tight emulsions are encountered and the break is clean and free so the water can be withdrawn immediately and continuously. The only chemical employed is the conventional type of fluid introduced into the lead lines at the wells or tank batteries to accelerate break between the oil and water.

Liquid-Level Controls

Pumps operating on liquid-level controls maintain a constant suction on the free water in the wash tank and deliver it into two surge tanks outside the oil-treating area. The water is piped from these vessels to two sand-filled vertical filters to prevent solids from flowing with the water into subsequent pipe lines and tankage. Experience gained from operating the system of salt-water disposal in the initial stages shows that the filters need not be backwashed oftener than once each week. The water passes from the filters into a horizontal receiver which supplies a reserve of water to the pipe lines leading the clean water to the field disposal tanks.

Two widely separated wells which were drilled on the east and west ends of the field were selected as disposal holes. These wells, bottomed in the Vedder sand, are too far removed from the anticlinal trap, or reservoir, to produce oil, and are approximately 11,700 ft. deep. They were completed with casing set on the field marker and cemented in the usual manner before continuing on into the anticipated productive sands. As oil-field-brine disposal wells, they were completed with full blank lines set through both sands and extending up into the full-length string of casing. These liners were then cemented to provide a complete seal from top to bottom. Subsequently, they were gun perforated at the desired point where the salt water was to be injected into the Vedder sand. Introduction of the brine, containing around 1,250 grains of NaCl, is through conventional tubing installed with a packer to prevent water, under high pressures, from rising into the string of casing, and perhaps to the surface. Perforation was accomplished, and

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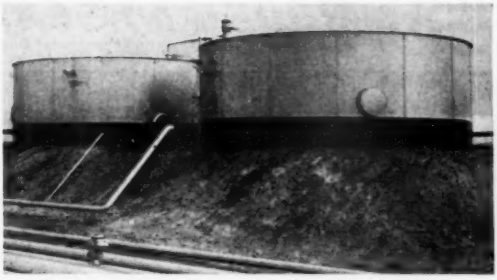
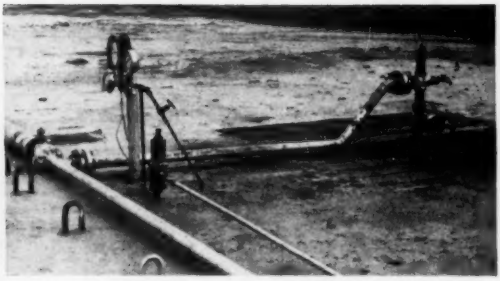
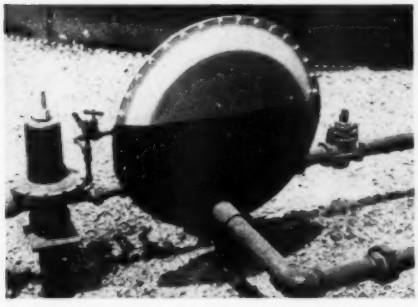


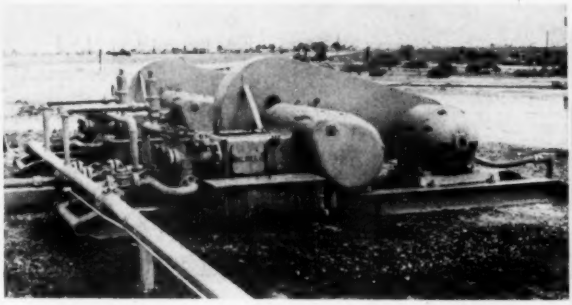
Receiving tanks in the east end of Rio Bravo field. Water, withdrawn from these tanks, is pumped to the disposal well.



Surface equipment of the brine-disposal well in Rio Bravo field. Brine, after treatment, is returned to the Vedder sand.



Controller which maintains gas-blanket pressure in the brine tanks.



These two triplex pumps are powered with 75-hp. electric motors. The pumps take suction on the storage tank, delivering oil-field brine to disposal well.

a full-length liner was set so that salt water could be pumped back into the sand from which it was originally produced.

The water produced with the oil in Rio Bravo averages approximately 3,500 bbl. per day, coming principally from wells operated by gas lift. This water, all the way through the system, is handled with dispatch without requiring extensive storage so the temperature can be preserved as high as possible until it reenters the sand. Botton-hole temperature in the field averages around 250° F., and the water returned to the formation is held at about 180° F. The high water temperature is maintained purposely to prevent formation of crystals at some points in the circuit between the wash tanks and the face of the Vedder sand.

Water from the surge tank at the battery of filters enters two storage tanks at each well from which injection pumps take suction. Each individual vessel in the system, from the wash tank to the disposal-pump suction, is provided with a blanket of gasoline-plant residue gas to prevent contact between the water and the air. Gas is piped to the tanks and vessel through control instruments set to maintain the pressure required to provide an adequate blanket. Only a few ounces of pressure is required on the tanks from which the injection pumps take suction, and the variation of the liquid level in these tanks is also quite small. Therefore, except in unusual conditions, the volume of gas required to maintain this blanket is also quite small.

Maximum Automatic Operation

The entire system of brine disposal has been designed, from the wash tanks to the disposal wells, with the idea of obtaining maximum automatic operation. The group of electric - motor - driven reciprocating pumps at each disposal well are controlled by liquid - level instruments attached to the reserve tanks from which they take suction. For example, if the continuity of water delivery should be delayed or broken, these pumps remain on operation until the water level in the suction tanks reaches a predetermined point. When the water surface falls below this point, remotely controlled circuit breakers are actuated and the motors stop immediately. But, when the flow of water into the tanks is again resumed and the level rises to the operating point, the motors are automatically started. Only one of the two pump motors is started immediately, however, as there is an appreciable time lag between the cutting in of the second pump motor to prevent exeecessive loading on the electrical circuit.

Because of the automatic features of the system, a minimum amount of attention is required to keep the disposal units functioning properly. Water being pumped from the wash tank is coordinated with supply and disposal rates to obtain the smoothest possible operation. Pumpers are relieved from operating duties of the system as much as practicable so that they need visit the various separate installations only at intervals to lubricate bearings, and to replenish the oil supply in the force-feed lubricator reservoirs.

Two reasons have been given respecting the return of oil-field brines to the Vedder sand. One is to prevent saturation of the surrounding land and the eventual contamination of fresh ground waters with salt water. The other is to replace the fluid removed from the sand with oil-field brines to assist in maintaining flowing pressures on the producing wells. Since these two injection wells are removed from the producing zone by two locations, fingering of injection water into the oil productive section of the Vedder is not anticipated.

No evidence of sand-face obstruction has been observed since the system was first placed in operation. One of the injection wells proved to be obstinate at the beginning, but acidizing removed what was considered to be cement residue that closed the sand pore spaces. Otherwise, moderately low pressures, plus the column of water in the tubing, have been sufficient to dispose of the brines satisfactory to the operators.

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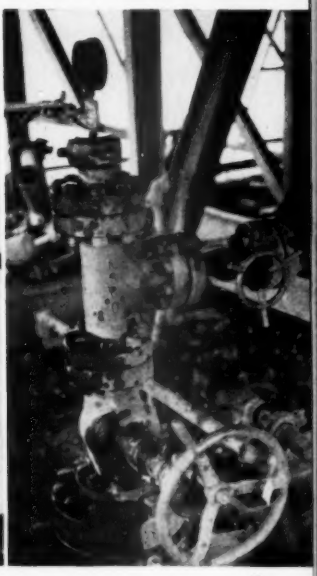

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CORROSION and its control

Corrosion Records

FEW things so handicap the corrosion engineer in his study of the corrosive conditions of an existing system, particularly one which is several years old, as a lack of records. Estimates based solely on the verbal reports of those who have been associated with the system are extremely unreliable. This is not necessarily due to faulty memories — although this is a factor—but rather to the lack of consistency in the basis of evaluation. The foreman whose maintenance crew is hard pressed to keep up with repairs on a given line will consider the corrosion on that line severe. On the other hand, a foreman whose crew is adequate to make the needed repairs without undue interference with their other work will consider the corrosion as "normal." Actually, the corrosion damage per unit of exposure may be several times greater in the latter case than in the former.

Personal estimates will also be greatly biased by previous experience. One man's "mild" can easily be another man's "severe," depending on where he has worked before and what he is used to. Similarly, leaks in accessible locations, and which occur at convenient times and involve little or no damage, make little impression; whereas leaks on deep pipe, in foul weather, and involving large amounts of lost oil and damage claims, assume an exaggerated importance. These factors are important—they may have a great deal to do with the expenditures which may be justified for protective measures—but they have nothing whatever to do with the severity of the corrosion.

PIPE INSPECTION OR LEAK REPORT

Approx. location ..... **mi.** ..... **of** .....
Exact location ..... **feet** ..... **of** .....
Pipe size ..... **depth** ..... **length exposed** .....
Coating: kind ..... **condition** .....
Type of joints: welded? ..... **screwed?** ..... **other?** .....
Type of soil (clay, sand, loam, etc.) at surface .....
at pipe depth (top) ..... **(bottom)** .....
Moisture at surface ..... **at pipe depth** .....
Reason for excavation .....
Nature of corrosive attack (describe fully) .....
.....
.....
Depth of deepest pit (in each 5 ft. of pipe) .....
Nature of repairs made .....
.....
.....
Recoating .....
.....
Remarks .....
.....
Date ..... **Signed** .....

Fig. 1—Suggested form for recording results of pipe inspection by field personnel. A report should be made in connection with every leak repaired (whether caused by corrosion or otherwise), and upon any other occasion where pipe is excavated.

Corrosive exposure can be evaluated from a survey of the soil, and from electrical measurements taken on the structure and its environment; these studies, indeed, make up a major portion of the corrosion engineer's work. But when a structure has been in operation for a number of years, a direct indication of the total corrosive situation should be available, in the form of the history of the structure. Too often, however, no such records exist.

The kind and quantity of information to be recorded in connection with each leak must vary according to the degree of familiarity with corrosion techniques, and according to the kind of instruments, available to each organization. Very often, the only opportunity for observation is at the time of leak repair, and the only personnel present are the field forces. As a minimum, the date, location, and description of each leak should be recorded. If the instrumentation is available, pit depths, soil resistivity, and more precise descriptions should be made.

Fig. 1 shows a form which may be mimeographed and supplied to the foreman of repair crews. A report on this form should be made each time a leak is repaired; but if its use is confined to such occasions, many potentially valuable data will be lost. A report should be made on every occasion when the pipe is excavated for any reason. In this way information as to the nonoccurrence of corrosion will also be obtained—and often this is as useful as the record of leaks.

Troublesome areas will be recognized and evaluated much more readily if all leaks due to corrosion are platted on a map. Segregation of leaks by years, by means of colors or other appropriate symbol, may prove helpful.

But records of leaks alone will not suffice to give a clear picture of conditions. It is necessary also to record such data as pipe weights or thickness, dates of installation, kind and amount of coating applied, and details of repair work done. It is not enough to know that a leak occurred in 1951, at such and such a location; it is not even enough to know that the leak was clearly the result of corrosion. How long had the pipe been in the ground? What was the wall thickness? What kind of coating? It is obvious that the answers to these questions are needed before the severity of the corrosion exposure can be judged.

In a word, quantitative data are required; opinions will not suffice, because opinions cannot be compared adequately. But given numerical data, it is at least possible to determine whether there exists a corrosion problem of sufficient severity to justify countermeasures; given enough such data, it can be determined how much the corrosion is costing, and therefore how much can justifiably be spent to forestall it. Many operators are quite unconsciously spending twice as much for repairing the damage of corrosion as would be required to prevent it.

Part 33 of a series by Marshall E. Parker, consulting engineer, Houston.

Making a Profit on Asphaltic Specialties

(Continued from page 95)

sure drop is associated with this section, leading to a greater load on the vacuum equipment, this disadvantage is outweighed by the effective stripping action obtained with the bubble trays. Above the stripping section the column is equipped with side-to-side pans except for the top tray which is a bubble tray employed to obtain more uniform distribution of reflux.

Outside liquid level.—Of the total gas oil produced by the vacuum column about 90 per cent comes off at the side-cut tray (fourth tray from the top). This is a heavy gas oil of 21°-23° A.P.I. gravity. The remaining 10 per cent is taken off overhead as light gas oil.

In a conventional operation of this kind liquid level is maintained within the column. In the Kerr-McGee operation the side-draw reservoir off the fourth plate is run dry and a seal is maintained by holding liquid level outside the column in the reflux accumulator.

Making base asphalts. — Maximum flexibility for production of asphalts of varying consistencies as desired is made possible by varying the top and intermediate reflux rates. Reflux is in the form of sprays. The intermediate reflux spray is introduced under the sidecut plate. A range of base asphalts can be made from flux material varying in hardness from 300 penetration down to 50 penetration and with softening points varying from 95° to 148° F. By proper segregation of crudes it has been found possible to produce a 10-penetration asphalt with this column.

For illustration, assume that a hard asphalt of below 50 penetration is desired. For this purpose a high reflux rate is maintained at the top and a low reflux rate under the sidecut tray. In the conventional vacuum tower making asphalt and operating with only overhead reflux, increasing the reflux rate would result in a softer asphalt. The opposite takes place in the Kerr-McGee operation. Greater reflux at the top results in greater condensation of vapors in the upper part of the tower. However, the greater volume of liquid so produced is not permitted to reach the bottom of the tower, being removed off the side-draw reservoir. On the other hand, with decrease in the intermediate reflux rate and with effective stripping action by the bottom four bubble trays, more vapor will leave the stripping section and find its way to the upper part of the tower to be condensed there. The net result is a harder asphalt.

For production of soft asphalt the side reflux is increased. The gas-oil liquid used as reflux knocks more vapor down below the seal pan, resulting in a softer asphalt.

Visbreaking Adds Flexibility

Kerr-McGee has developed its visbreaking operation to permit seasonal production of No. 6 fuel oil with existing equipment. Visbreaking is conducted in the No. 2 furnace at 940° F. Note that this is visbreaking of vacuum tower bottoms which at times may be a 50-penetration material. Gradual heating is required to prevent coking when running such a material through the furnace. Design of the old box furnace, however, makes it suitable for this operation.

When visbreaking for No. 6 fuel, the flow goes directly from the bottom of the vacuum column to the No. 2 furnace. From the furnace it goes to the top of a reaction chamber. This reaction chamber (not shown in the flow sheet) is hooked in on the line between the No. 2 furnace and the No. 1 fractionator. Flow from the reaction chamber is to the evaporator from which No. 6 fuel oil stock is obtained as bottoms with pressure distillate and noncondensables going overhead.

With careful operation, a time-temperature curve through the heater can be obtained exhibiting slow rise in temperature without local overheating or appreciable leveling off in any section of the furnace. Further care in minimizing separation of liquid and vapor in the furnace tubes contributes greatly toward holding down formation of coke. A material slight-

WICKES

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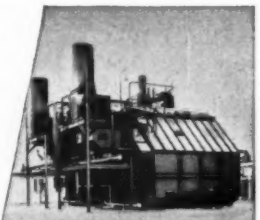
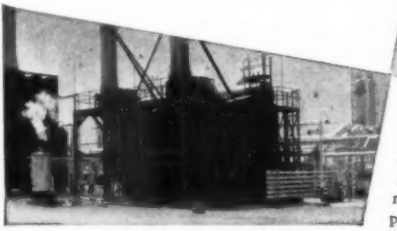


West Texas Natural Gasoline Plant



Central Texas Natural Gasoline Plant

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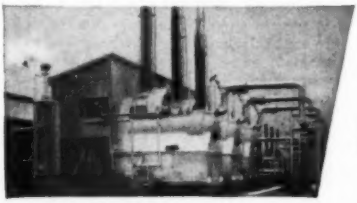

Louisiana Refinery

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ly heavier than No. 6 fuel oil is produced. This is cut back with 4 per cent (based on total volume of fuel) of gas oil to obtain proper viscosity for No. 6 fuel oil.

Asphalt Specialties

With base asphalt stocks from the vacuum tower controlled to give desired penetration and melting point within the limits noted, a wide range of salable asphalt products can be made in the finishing operations. By blending penetration asphalt with cutter stocks cut-back asphalts for road construction are obtained. Blown asphalts produced by oxidation go into various roofing materials.

Fig. 2 indicates the sequence of finishing operations and some of the end products. Kermac lists some two dozen asphalt products in the "specialties" group in addition to the various specifications of cutback asphalts used in road building. While the volume production of any one given specialty product may be relatively small, diversification of products through the operation described here has enabled Kerr-McGee to conduct a profitable operation with the current throughput level of 9,500 bbl. per day at its Wynnewood refinery. With the possibility of further diversification in mind a research program is under way at the Kerr-McGee laboratories in Oklahoma City. Basic research on asphalts is also being conducted for Kerr-McGee at Oklahoma A. & M. College.

Acknowledgment

Appreciation for aid given in the preparation of this article is expressed to James J. Kelly, manager of the refining division of Kerr-McGee Oil Industries, Inc., and to Cliff Wise, superintendent of the Wynnewood refinery, Sam Harris, chief engineer, and Howard Hopps, Jr., chief chemist.

Rock Hardness vs Rock Penetrability

(Continued from page 100)

piercing)[11] or by some other type of future development such as those based on sonic rock properties. Drillability, on the other hand, refers only to penetration by a drilling tool. It may be defined[12] as the rate at which a rock is bored by a definite type of drilling tool with the assistance of a specific type of cutting surface or medium and under specific conditions as to speed of rotation and/or applications of pressure.

The Bassinger rotary - percussion type drill[11] under certain conditions has bored holes in rock more rapidly than the normal rotary and percussion drills. Since the rock-hardness factor for the latter two types of drills is based on entirely different rock properties—resistance to compression and impact—how could one define rock hardness in the case of the Bassinger drill, which combines both rotary and percussion action? In this case, as in many others, it would seem simpler to refer to penetrability and not to the hardness of a rock.

Other examples of the impossibilities involved in the usage of the term rock hardness as it pertains to drilling operations are found in the work of McCray and Christensen outlined below.

In diamond-drilling operations in Crane County, Texas, McCray[15] reports, "As different strata of limestone drill at widely different rates, varying from perhaps 6 or 8 to 90 minutes per foot, and as sandstones generally core at rates from 5 to 10 minutes per foot, much faster on the average than limestones or dolomites, it must be concluded that hardness is not a factor of the rate of penetration." He also observed that "very finely crystalline limestones were the slowest drilling of all rock sections penetrated. Limestones and dolomites formed of larger crystals drilled faster — sandstones which drill faster than limestones, in general have grains whose sizes are considerably greater than limestone crystals. On the other hand, the mineral of finest crystalline structure, the chert, is drilled at rates from 20 to 30 minutes per foot or three to five times faster than the finely crystalline limestone. This fact is largely explained by the tendency of chert to chip out with a characteristic conchoidal fracture."

According to Christensen's charts[16] of diamond-drilling time on the various members of the Weber sand section at Rangely field, Colorado, dolomite was penetrated at an average of 8.5 minutes per foot, sandstone at 8.7 minutes per foot, and shale at 13.4 minutes per foot.

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Reservoir Analysis of Redwater Pool

(Continued from page 115)

ter-oil contact, or into the aquifer along the west edge of the pool.

The North Saskatchewan River, which flows through the field, provides a convenient source of fresh water, and it is not anticipated that any serious treating problems would be encountered in the injection of this water.

The rates of injection necessary to maintain the reservoir pressure at 600 psig. up to the end of 1954 are also shown in Fig. 3. After this time, the proportion of the withdrawals which would have to be replaced with injection would continue to increase, due to a diminishing rate of the natural water influx. Eventually, practically complete pressure equalization would occur throughout the aquifer, and all net withdrawals from the reservoir would have to be replaced by injection.

Pressure Restoration

Consideration has been given to the possibility of injecting enough water into the formation to raise the reservoir to a pressure either equal to or exceeding the original value of 1,050 psig. This procedure would not be expected to result in any greater ultimate recovery than would be obtained with pressure maintenance at 600 psig. However, practically all wells in the field except those making water could be produced by natural flow, and considerable savings in operating expense would result. The increase in the volume of water which would enter the reservoir, compared to pressure maintenance at 600 psig., would only be the amount that the undersaturated oil in the reservoir would be compressed. It has been calculated that the additional rise in the water table would be only about 1 ft., causing no significant reduction in the producing life of individual wells.

Predictions of the pressure rise to 1,050 psig. for various rates of injection, assumed to start in May 1952, are shown in Fig. 4. A constant rate of injection of 150,000 bbl. per day would raise the pressure from 790 to 1,050 psig. in 27 months, 175,000 bbl. per day in 18 months, and 200,000 bbl. per day in 11 months. If a higher pressure is necessary to make the wells flow easily, these rates of injection would have to be continued for a short time longer. During the period of rising pressure, and for some time after the original value was reached, the natural-water-drive situation would be reversed, with the pressure near the field being higher than the remainder of the reef. Injection rates could be gradually diminished after the desired pressure was attained, but would have to be somewhat larger than the net withdrawal rates until the entire reef were again equalized at the original pressure. This should occur when the cumulative volumes of injection and withdrawal become equal. Then, as in the case of pressure maintenance at the saturation pressure, injection would only have to be sufficient to replace withdrawals.

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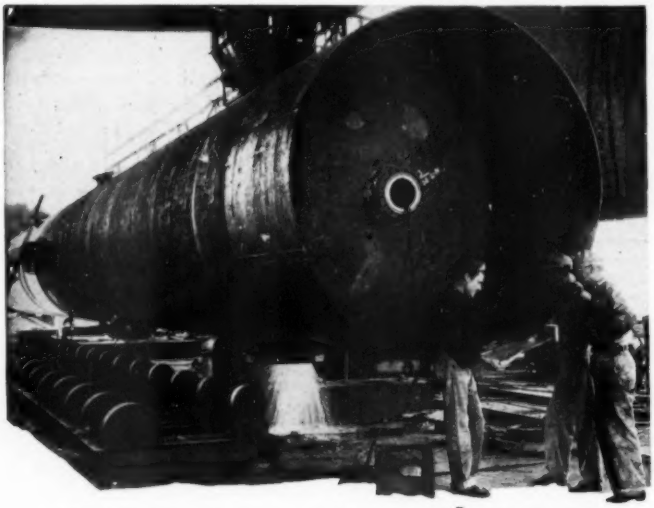

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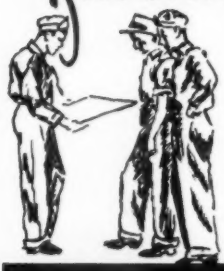

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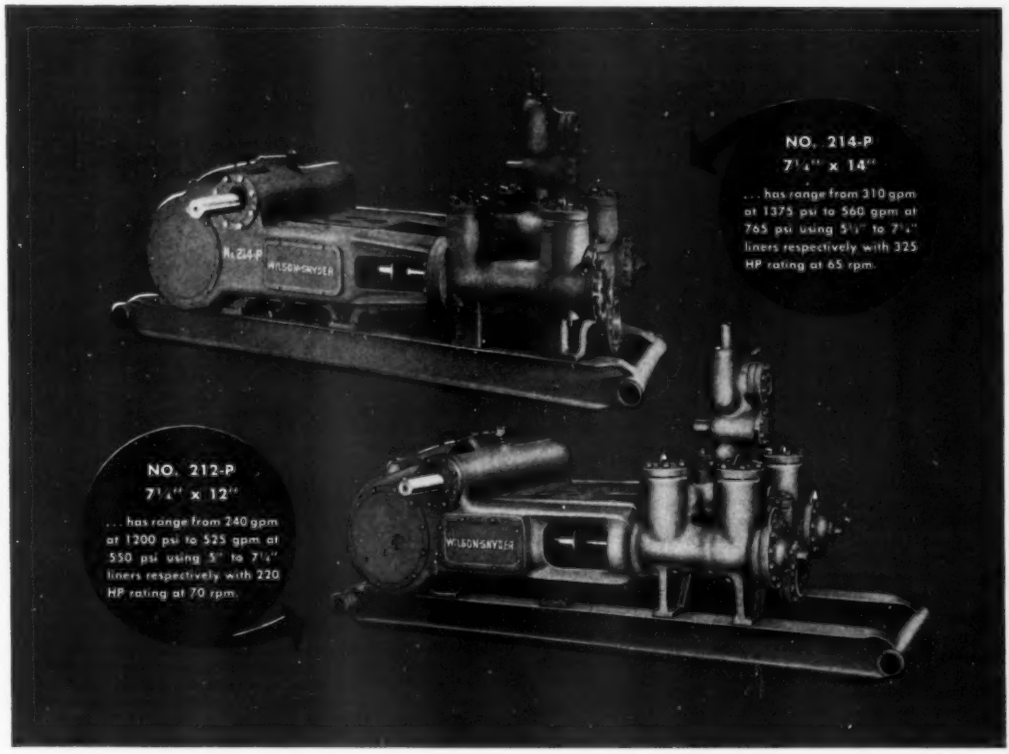
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Aluminum Pipe Lines

SINCE 1946, the capacity for producing aluminum has doubled and much of the new production has gone into civilian uses. Lightweight aluminum pipe lines have been attracting more and more interest in the petroleum industry. Table 1 shows most of the installations.

Although the cost of aluminum pipe is 50 per cent or more greater than the cost of comparable-strength steel pipe, its final installed cost may be scarcely greater than for steel. This is possible because of:

1. Decreased handling costs due to light weight.
2. Elimination of wrappings in some soils.
3. Elimination of pipe cleaning in those situations where a wrapping is required.
4. Better corrosion resistance than steel under many conditions.
5. Reduced welding costs due to faster lineup and fewer welding passes.
6. Elimination of heavy frames for overhead systems.
7. Elimination of painting when exposed above ground.
8. Decreased pumping costs due to lower friction factors.

In laying underground lines significant savings in cost are possible in (1) stringing the pipe; (2) lineup, bending, tacking, and welding; (3) cleaning, priming, painting, or wrapping; and (4) lowering (lighter booms).

Reynolds Metal Co. has recently announced that an examination of a 40-ft. bare aluminum bypass on Alabama-Tennessee Natural Gas Co.'s line at Listerhill, Ala., shows no discoloration or corrosion of any sort on the outside or inside of the line. The bare section had been in service for about 17 months. For these soil conditions it was agreed that bare pipe would last for an indefinitely long time. The 40-ft. bypass section was installed complete with values so that it could be removed for examination at regular intervals.

Discussion of the marine pipe line of Lavaca Pipe Line Co. and Alcoa's Development Division, appeared in the November 4, 1948, and July 5, 1951, issues of The Oil and Gas Journal. Under the conditions encountered, the cost of the aluminum line was the same as for a steel line, and it is quite possible that the aluminum line will outlast a conventional wrapped steel line.

Siliconized Coating on Molybdenum Allows 2,500-3,000° F. Temperatures

FANSTEEL METALLURGICAL CORP. has developed a method of applying a silicon-rich surface to molybdenum equipment. The coating permits exposure to temperatures of 1,500° F. (6,000 hours), 2,500° F. (200-800 hours), or even 3,000° F. (50-300 hours). It is impervious to oxidation and is unattacked by nitrogen, carbon dioxide, carbon monoxide, and the sulfurous or hydrocarbon atmospheres that may result during combustion. The bond between the coating and the base metal is integral with no tendency toward flaking, peeling, or spalling. Most or all of the fabrication or forming of the part should be completed before siliconizing.

In these days of chromium and nickel scarcity, the new siliconized molybdenum material in the form of wire may find use for electrical heating elements (furnaces) and spark gaps for ignition systems. Other uses are nozzles, flame holders, thermocouple wells, jets, crucibles, probes, and gas sampler tubes. It is not recommended that the coating be used at high temperatures in contact with molten gas, strong alkalies, or such metals or alloys as copper, iron, nickel, cobalt, chromel, nichrome, and stainless steels.

At present, only relatively small items can be handled, and rod or wire lengths are limited to 30 in.

Aluminum Instrument Tubing

ALTHOUGH scarcity is arising in connection with many metal items, it is still possible to select metals that are less scarce than others. Aluminum instrument-air tubing is more readily available than the conventional copper tubing. Part of this advantage lies in the fact that more feet of tubing is obtained from a pound of aluminum than from a pound of copper. Thus, in ¼-in. tubing, a pound of aluminum alloy produces over three times as many feet of tubing as does copper. Copper weighs 3.3 times as much as aluminum.

Cost is the major advantage of aluminum instrument tubing, but users are finding little evidence of corrosion or lack of physical properties (*Kerns and Baker, Aluminum's Role in Refinery Equipment, The Oil and Gas Journal, July 19, 1951, page 87*). Difficulty with corrosion may be encountered if the concentration of acid fumes is high, particularly hydrochloric acid and in very damp climates. The alloys are used in the annealed (O) condition and are designated as soft (S). Thus, type 4SO has been used. This alloy is said to have a better fatigue strength than other common soft alloys such as 3SO and 52SO. Recently another soft alloy 150SO has been offered (Kaiser Aluminum & Chemical Sales, Inc.) which has properties intermediate between those of 3SO and 52SO but it probably has not yet been employed for instrument tubing. Aluminum alloys are usually quite resistant to sulfide corrosion.

During mid 1951, the cost of 3SO aluminum tubing on a per foot basis was a little over half the cost of copper tubing. The cost of aluminum connectors is about the same as from brass connectors. Many miles of tubing is required for each refinery installation, gasoline plant, distillate plant, or chemical process. The saving in cost per mile of tubing (⅞ in.) over copper tubing is in the range of $150-$200.

TABLE 1—ALUMINUM PIPE-LINE INSTALLATIONS BY THE PETROLEUM INDUSTRY

	Company	Year	Place	Conditions	Fluid	Pipe size o.d. (in.)	Pressure (psi.)	Total length (ft.)
1.	(Contractor-Alum. Const., Ltd.)	1947	England	.....	.....	6	...	...
2.	Interstate Oil Pipeline Co.	1948	South Louisiana	Brackish acid marsh	Crude oil	4½	...	2,640
3.	Interstate Oil Pipeline Co.	1948	S.W. Arkansas	Sour crude	Crude oil	4½	...	2,640
4.	Interstate Oil Pipeline Co.	1948	S.W. Arkansas	Sour crude	Crude oil	6	...	2,640
5.	Interstate Oil Pipeline Co.		S.W. Arkansas	Sour crude	Crude oil	6⅝	...	26,400
6.	Anglo-American Oil Co., Ltd.	1948	Purefleet, England	Above salt water on jetty	Gasoline	8	120	350
7.	Anglo-Iranian Oil Co., Ltd.	1948	Abadan, Iran	.....	Sewage	4	100	2,016
8.	Lavaca Pipe Line Co.	1949	Lavaca Bay, Tex.	Salt water	Natural gas	4	...	4,000
9.	Carter Oil Co.	1949	Bowie, Okla.	Aerial suspension	Natural gas	10¾	250	330
10.	Royal Dutch-Shell Interests	1950	Lake Maracaibo, Venezuela	Salt water	Crude oil	4	...	1,000
11.	Alabama-Tennessee Nat. Gas Co.	1950	Listerhill, Ala.	Buried	Natural gas	8⅝	250	9,504

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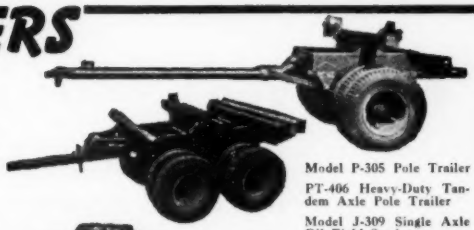

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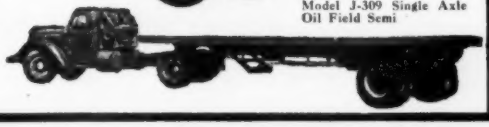

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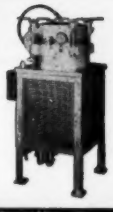

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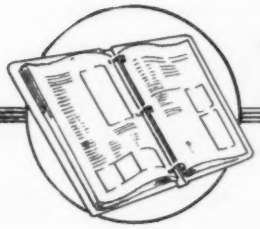


THE REFINER'S notebook

No. 94

Plastic Refractories

by Ray A. Witschey*

REFRACTORY specialty products, including mortars, coatings, and castable refractories, were discussed in the preceding installment of The Refiner's Notebook. A table of properties of some refractory and insulating castables was presented.

Perhaps the best known castable is the standard castable using high-heat (first-quality fire clay) grog as an aggregate. The maximum service temperature for this type of product is usually around 2,600°-2,700° F., although the use of higher-quality materials (both aggregate and cement) has resulted in the manufacture of castables for service temperatures of up to 3,000° F.

Insulating refractory castables are prepared by using insulating firebrick calcine, or its equivalent, as an aggregate. The insulating castables are prepared using aggregates consisting of natural insulating materials such as diatomaceous earth, vermiculite, and other lightweight mineral products.

Most of these castable products are available in forms suitable for gun placement as well as the form developed for mix-and-pour placement. Special castable products for specific service applications are available and in the process of development.

*Ceramic engineer, A. P. Green Fire Brick Co. Portion of paper presented at John Zink Heating Seminar, Tulsa, 1951.

Plastic Refractories

Plastic refractories are furnished in moldable, putty-like form ready for ramming into place. They are sometimes called moldable firebrick. Plastics were developed for making small repairs. Today complete linings in the largest type units are not uncommon. Years of development work have resulted in the use of anchors and supports of many types and advanced methods of construction for complete monolithic enclosures.

Plastic refractories are generally of two types, corresponding to the properties of high-duty and super-duty fire-clay refractories. These products are heat setting. A recent development is the use of air setting or high strength plastic for special applications. Chemical and physical properties of plastic refractories are given in Table 1.

Ramming Materials

Ramming materials might be considered as a special application plastic. These materials generally contain greater quantities of aggregate, less bonding agent, and lower moisture content. They require higher ramming or pouring pressures and different application techniques. They generally exhibit lower porosity and lower shrinkage, both in drying and burning.

Ramming materials of the fire-clay group are not as extensively used as those of the other refractory groups.

TABLE 1—PROPERTIES OF SOME PLASTIC REFRACTORIES

Product— Class—	Quik-Pak High duty	Super-Plastic Super duty	Super-Hybond High strength
Pyrometric cone equivalent—A.S.T.M. C 24-46	31-32	32½-33	32½-33
Temperature equivalent—Bureau of Standards scale, °F.	3,075	3,150	3,150
Water content—A.S.T.M. C 92-46 (per cent)	10-11	9-10	9-10
Workability—A.S.T.M. C 181-47 (per cent deformation)	30-35	28-33	28-33
Drying and firing shrinkage—A.S.T.M. C 179-46:			
Per cent shrinkage or expansion at 2,550° F. (1,400° C.)	0.5-1.5 Shr.	Test not used	0.5-0.7 Exp.
Per cent shrinkage or expansion at 2,910° F. (1,600° C.)	Test does not apply	0.0-2.0 Exp.	3.0-4.0 Exp.
Hot load test (9 by 4½ by 2½ specimen, dried but not previously fired)—A.S.T.M. C 16-41:			
High duty 2,460° F. (1,350° C.) per cent of compression	4-6	Test not used	Test not used
Super duty 2,640° F. (1,450° C.) per cent of compression	Test does not apply	7-9	7-9
Panel spalling test (molded 9 by 4½ by 2½ specimens)—A.S.T.M. C 180-47:			
Preheated at 2,910° F. (1,600° C.) per cent loss	0.5-1.5	Test not used	Test not used
Preheated at 3,000° F. (1,650° C.) per cent loss	Test does not apply	0.5-1.5	0.5-1.5
Modulus of rupture (9 by 4½ by 2½ specimen)—not standard test on plastic:			
Dried at 220° F., psi.	50-75	50-75	300-400
Fired at 1,000° F., psi.	50-75	80-100	200-300
Fired at 1,500° F., psi.	75-125	150-200	200-300
Fired at 2,000° F., psi.	200-300	600-750	650-800
Fired at 2,500° F., psi.	450-600	800-950	850-1,000
Thermal conductivity	Approximately one-half that of firebrick		
Estimating data—lb per cu. ft.	133.3	133.3	133.3

The test data shown above are average results of control tests and are subject to normal variation on individual tests. These results cannot be taken as maximum or minimum requirements for specification purposes.

Here's all you need for field assembly

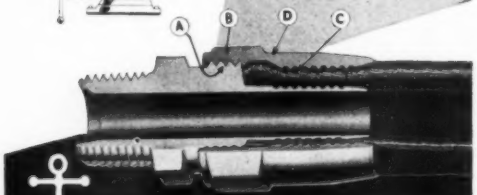
Oil-can

Wrench

Vise

HOW ANCHOR'S PATENTED REUSABLE COUPLING GRIP WORKS:

The thread on the body of the insert (A) and on the shell (B) is designed to insure positive engagement and minimize stripping. Our patented grip provides a uniform compression area (C) and additional packing of the hose in recess (D).



ANCHOR 2 piece Reusable Couplings

Makes Field Service Quick and Easy!

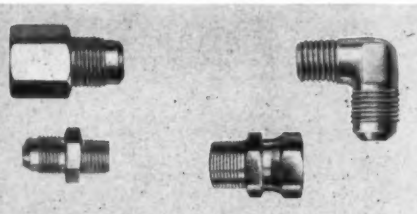
You'll really go for the convenience of Anchor Reusable Couplings. Assembly and disassembly in the field is quick and easy. No special tools required. Downtime kept to a minimum.

Couplings can be used again and again. You need no expensive inventories of prefabricated hose assemblies in varying lengths.

And the patented grip of Anchor Reusable Couplings gives an extra margin of safety against leaks and blowoffs.

Use Anchor Couplings — couplings that stand up to the most rugged field conditions . . . make servicing easy . . . reduce downtime . . . cut inventories. Write for latest bulletin.

OG-81



Straight adapters, 90° elbows, adapter unions and related fittings make piping easier.

Also factory-assembled ductile sleeve couplings and field-service clamp-type couplings.

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Factory: Libertyville, Ill. • Branch: Detroit, Mich

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Why Clay Content Affects Permeability of Reservoir Sand

PRESENCE of clay minerals in sandstones, siltstones, and claystones included in oil pay zones affects to a major degree the permeability of the reservoir to fluids. Addition of relatively insignificant amounts of certain clay minerals to a reservoir sand will decrease the fluid-flow characteristics far out of proportion to the abundance of the clay material.

Importance.—Oil sands containing high percentages of clay minerals will exhibit substantial changes in permeability values when water carrying cations different from those of the connate water is injected into the sand, either through use of a water-base drilling mud or in water-flooding injection operations. This alteration occurs through the mechanics of base exchange, flocculation-and-deflocculation, and water adsorption phenomena. As a result the volumes of the contained clay are increased many-fold, and the arrangement of the clay particles altered.

These so-called "dirty" sands have been recognized from cores in reservoirs of many geologic ages throughout the world, particularly in the Eocene Wilcox series of the Gulf Coastal plain, the Cretaceous sands of the Rocky Mountain province, and various Cenozoic sands in California. Dirty sands affect productivity and injectivity indexes and complicate the interpretation of the electrical-log characteristics of a well.

Clay mineral sizes.—Electron microscope studies of clay minerals, under magnifications as high as 150,000, reveal clay minerals to be small shards with lengths up to 2 μ. These shards, generally of volcanic origin, were finely disseminated in fine-grained siltstones and claystones in water-laid sediments. Clay minerals exhibit electro-kinetic phenomena. Shown in Fig. 1 are the proposed size standards recommended by the American Geophysical Union in 1947. Opposite this scale appear accepted size ranges for detrital materials in clastic rocks such as clay minerals, heavy minerals, feldspars, micas, and quartz. Size range for clay minerals ranges from about .0001 to .015 mm.

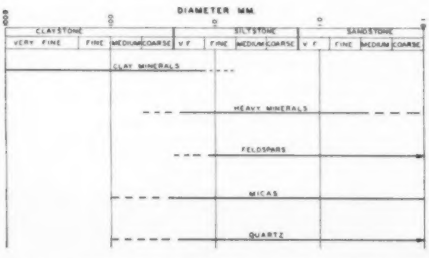


Fig. 1—Range of size of detrital materials in clastic rocks.

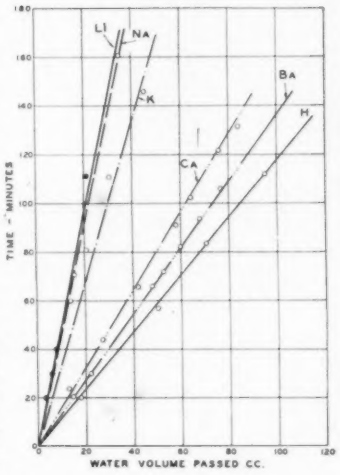
Physical arrangements.—X-ray diffraction criteria studied by mineralogists suggest that the mica-type alumino-silicate layer structure of clay minerals occurs naturally as discrete minerals, as random-layered intergrowth of mixed species, and as regular alternating intergrowths of two complementary species. Clay members of the montmorillonite group may contain mixed layers of micas, chlorite, talc, brucite, or other minerals.

Minerals of the montmorillonite group are made up of silicate layers formed from double sheets of linked silicon-oxygen tetrahedral groups joined by aluminum-oxygen-hydroxyl octahedral groups. The essential feature of such a lattice, in addition to its layer characteristic, is the constancy of the oxygen-hydroxyl frame work.

Varied chemical compositions result from ionic substitutions in both tetrahedra and octahedra.

Water permeability.—The remarkably high adsorptive power of montmorillonite is related directly to the lattice-structure construction of the unit cell; this arrangement permits expansion of the C-axis from 12 to 16 Angstrom units. (See Fig. 3.)

Like different priming charges, the kind of adsorbed ion plays a major role in the amount of water which can be passed through the sand. From Fig. 2, it can be shown that a Ca-base clay will pass more than three times the amount of water through a colloidal membrane than will a Na-base clay, for a given time interval.



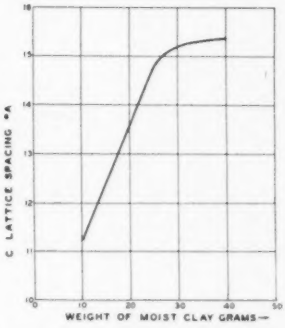


Fig. 2—(Left) Effect of adsorbed ion on water permeabilities of colloidal clay membranes (after Baver).

Fig. 3—(Above) Relation of moisture content and spacing between lattice planes in montmorillonite (after Nutting).

By Joseph A. Kornfeld, Mid-Continent District Editor, Tulsa

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OIL AND GAS EQUIPMENT Digest — IT'S NEW — CHECK IT

TRADE LITERATURE

1 BULLETIN 511 describes a new line of protective coatings and wrappers for pipe lines, featuring freedom from holidays, extreme resistance to water, water vapor, chemical and bacterial action, and high resistance to mechanical damage. *Trenton Corporation.*

2 CATALOG 203 illustrates and describes 138 different models of hydraulic valves, each in varying sizes, and lists every standard hydraulic valve offered in the industry. Working drawings and specifications are furnished for each model and size valve. *Rivett Lathe & Grinder, Inc.*

3 KASKADE FRACTIONATING TRAYS. A four-page varicolored pamphlet describes the function of these trays in chemical plants for separating simple and complex mixtures, and in refinery, coke oven, chemical, and gasoline-plant operations such as crude and coal-tar distillations, cracking plant fractionators, and vacuum distillation. *The Koch Engineering Co., Inc.*

4 FILTERS FOR THE PROCESS INDUSTRIES, an eight-page bulletin, lists and briefly outlines features and applications of 21 types of filters, with detailed descriptions. It also covers the Olivite acid-handling pump and the ODS slurry and sludge pump. *Oliver United Filters, Inc.*

5 SEALING AND LUBE COMPOUNDS CATALOG describes 12 different compounds for thread sealing and valve lubrication, including general-purpose thread and gasket sealing and antiseize compounds, as well as specialized mixtures for service with aluminum parts, and for alcohol, oxygen, and fuel-handling systems. *The Parker Appliance Co.*

6 NEW INDUSTRIAL TAPE SELECTOR CATALOG contains five standard 8½ by 11-in. easily removed file cards with visible tabs enclosed in a cardboard folder. Cards are provided for "General Purpose Tapes," "Electrical Tapes," "Special Purpose Tapes," and "General Information." Across each card are sample strips of tape described along with technical specifications and general information. *Polyken Industrial Tape, Department of Bauer & Black.*

7 PLASTIC ROCK FLOORING. New eight-page, two-color brochure contains a combination of information on how and where to apply plastic rock flooring as well as certain technical data about the product itself, together with illustrations on typical flooring applications. *United Laboratories, Inc.*

8 RADIAL AND UNIVERSAL DRIVESHAFTS. Bulletin F41-51 gives complete data and specifications on Morflex radial driveshafts with spline-jointed tubular shafts, and universal driveshafts with one-piece and spline-jointed tubular shafts. A working table of maximum recommended lengths and speeds is included. *Morse Chain Co.*

9 CHROMALOX "PACKAGED" ELECTRIC HEATERS is an illustrated brochure which describes immersion, circulation, and other heaters with built-in controls, used in chemical, plastics, petroleum, and re-

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Oct. 25, 1951

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OIL AND GAS EQUIPMENT Digest NEWS CHECK IT

lated industries. *Edwin L. Wiegand Co.*

10 PUBLICATION 1287 explains and illustrates Mark V 6RPH 200-312 b.hp. four-cycle compression-ignition oil engine. Specifications as well as weights and dimensions, are given. *Davey, Paxman & Co., Ltd.*

11 TWECOLOG illustrates and describes electrode holders, ground clamps, cable and terminal connectors, cable splicers, mechanical and solder-type cable lugs, and carbon electrode holders. Contains information about the care and maintenance of electric welding cables and connections. *Tweco Products Co.*

12 WELDING ELECTRODES AND WELDERS' VEST POCKET GUIDE, a pocket size booklet, gives information on metals and electrodes, types of electrodes, four essentials of proper welding procedures, and other related information and instructions. *The Hobart Brothers Co.*

13 CONNECTOR TYPE SWIVEL-BAIL. Bulletin I-363-A discusses the procedure for converting a conventional swivel-bail to the Ideal connector type swivel bail. Use of the improved bail provides fully articulated load equalization, saves time and effort in drilling operations, and reduces maintenance costs. *The National Supply Co.*

14 BFM FACTS book acquaints industry with the substantial dollar and time savings plus guaranteed original equipment performance that is possible with BFM techniques in rebuilding and remodeling power equipment. Departments covered include engine remodeling and rebuilding, machining and testing, and electrical fabricating. *BFM Industries, Inc.*

15 THE HOW BOOK OF COST CUTTING MATERIALS HANDLING, a 24-page booklet, is concerned with basic background material covering types of skids, pallets, and other industrial handling tools. Enclosed are charts and summary sheets for making a materials handling analysis. *Yale & Towne Manufacturing Co.*

16 PRESSURE SWITCHES. A 32-page manual discusses the complex problems involved in the proper application of vital electric-hydraulic links. It includes a glossary of terms, tabulation of available units based on function and pressure or vacuum range, diagrams for circuit detailing, and electrical rating table. *Barksdale Valves.*

17 ENGINEERING PROPERTIES AND APPLICATIONS OF NI-RESIST, a reference booklet, well illustrated with photographs, tables of properties and corrosion data, describes eight types of austenitic nickel alloy cast irons that offer unique combinations of properties. *The International Nickel Co., Inc.*

18 CONTROLLERS. Bulletin 957 covers a series of standard controllers applicable to furnaces and boilers, and as regulators for various types of lever valves, dampers, and rheostats. *A. W. Cash Co.*

19 VINYLITE RESINS. A 25-page booklet describes the use of Vinylite resins for producing surface coatings, both protective and decorative, applicable to metals, cloth, paper, masonry, and wood as air-dry or baked-on finishes. It covers application methods such as dipping, brushing, spraying, and roller and knife coating. *Bakelite Division, Union Carbide & Carbon Corp.*

20 WIRE ROPE. Rope selection, storage and handling, operation, reeving up, and inspection and maintenance are the topics of discussion in a four-page pamphlet covering the use of wire rope. *Macwhyte Co.*

21 COMPRESSION PIPE COUPLINGS are described in detail in a four-page bulletin. These couplings range in sizes from ½ to 14 in. standard pipe sizes, including intermediate tube sizes. They also couple ferrous to ferrous materials, or ferrous to nonferrous materials. *Morris Coupling & Clamp Co.*

22 INSTALLATION AND MAINTENANCE TOOLS is a 15-page bulletin which describes and illustrates various types of expanders, air motors for tube rolling, buffing tools, polishing wheels, reversible ratchet wrenches, and plug-pulling devices. Tool size and weight charts are included, as well as price lists. *Key Co.*

FOR MORE INFORMATION . . . . use one of these cards

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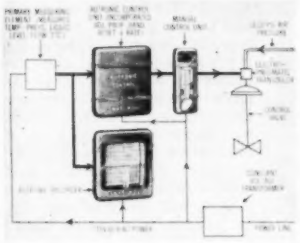
IT'S NEW CHECK IT

by Dan B. Miller

23 NEW AUTOMATIC ALL-ELECTRONIC INSTRUMENTATION AND CONTROL SYSTEM for use in chemical processing plants, refineries, petrochemical installations, industrial power plants, and central stations consists essentially of three basic units: Primary sensing element, Autronic control unit, and final control element. The system is powered by 115-volt 60-cycle alternating current. The primary sensing element generates a voltage which is directly proportional to any change in the process variable. This voltage is transmitted to the Autronic control where it is continuously modulated by electronic means. The Autronic control unit then transmits the resulting direct current to the final control element which may be either electrically or pneumatically operated. Since transmission of information throughout the system, from primary element to final element, is by electrical means only, there is no transmission lag. Plug-in type Autronic control unit can be mounted at any convenient location so that all adjustments can be made at the graphic panel or central control point without the usual transmission lags. The unit incorporates accurately calibrated adjustments for proportional band, reset, and rate time (derivative). *The Swartwout Co.*



IT'S NEW CHECK IT

24 TRAILER-MOUNTED DRILL RIG. Designed for 200 input horsepower, this Ideal Type T-20 rig, complete with mast and accessories, is normally considered for drilling in the 2,000 to 4,000-ft. depth range, and for servicing and workover jobs in the 4,000 to 8,000-ft. range. Mobility was an important consideration in the design of this torque-converter-driven rig so that it may be moved over especially rough terrain. The 95-ft. telescopic mast is raised to a vertical position by two hydraulic rams after which the inside section is elevated with cable by the draw works, locked in position, and guyed to ground anchors. Braces tie the rotary-table foundation to the trailer frame, and evenly spaced jacks under the latter provide a solid foundation to eliminate sway strains on the mast guys. The rig is further equipped with an independent pump drive for an Ideal Type C-150B slush pump. *The National Supply Co.*

IT'S NEW CHECK IT

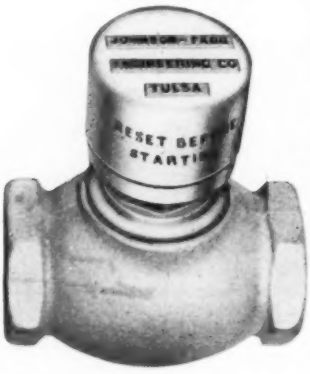
25 HIGH-PRESSURE TRIPLEX PUMP. The unit is available in 15, 30, and 50-hp. sizes with pressure ratings up to 5,000 psi. and displacement ratings up to 60 g.p.m. Special 10,000 and 20,000-psi. heads are available. Features of the Triplex pump include integral gears, available in a wide variety of ratios. The unit can be obtained with an integral, dripproof Sterling electric-motor drive which greatly simplifies installation problems common to this type of pump. Plungers and liners are interchangeable, which provides a variety of pressure-volume ratings for each unit. Spring-loaded balls and hardened-and-ground seats serve as inlet and outlet valves. Pressure lubrication is one of several builtin features which also include pressure gage, relief valve, and scavenger pump. The Kobe Triplex is completely enclosed. *Kobe, Inc.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

26 J-F AUTOMATIC CUTOFF SWITCH VALVE for recycling units stops the prime mover when the stock tank is empty. This eliminates the necessity for the lease pumper to return and shut down the unit. When the fluid flow ceases, because of pump failure, belt failure, or if the intake or discharge line plugs up or is cut off, the switch valve will automatically shut down the prime mover. Two electrical terminals are provided which make it possible to hook the circuit to ground the magneto on an engine or operate a relay to cut off an electric motor. The J-F switch mechanism is mounted on a standard 2-in. check valve, but other size valves are available if desired. *Johnson-Fagg Engineering Co.*



IT'S NEW CHECK IT

27 WHIRLWIND 80 is a rotary scythe mower that turns clippings into valuable mulch. It cuts a swatch 6 ft. and 8 in. wide through heavy weeds and brush. Clippings are finely shredded and scattered. The triple universal-joint drive will absorb the power of the largest farm tractors. The rugged one-piece frame is arc welded for strength. Cutting height is easily adjusted from ground level to 14 in. Wheels and cutter spindles run on Timken tapered roller bearings. All moving parts are completely shielded for safety and protection. The unit is ideal for lease work. *Toro Manufacturing Corp.*

IT'S NEW CHECK IT

28 TGC-16 INDUSTRIAL GAMMATUBE. A rugged, stainless-steel tube especially designed for industrial process control procedures using gamma rays, and for cosmic-ray counting. Will be used for such industrial applications as oil-pipe-line inspection and liquid-level gages. Features include the complete absence of any flanges, bases, and base pins; a wall thickness of approximately 400 mg/cm², life greater than 2×10^8 counts, a starting potential of 870-930 volts, and a minimum plateau length of 200 volts with a slope of approximately 1 per cent per 100 volts. The fill gas used is helium with an organic quench and the tube has a recovery time of approximately 200 microseconds. Supplied with a standard sensitive length of 12-in., the new tube is available upon special order in lengths from 5 to 20 in. *Tracerlab, Inc.*

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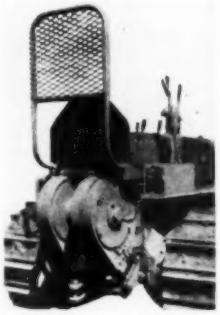


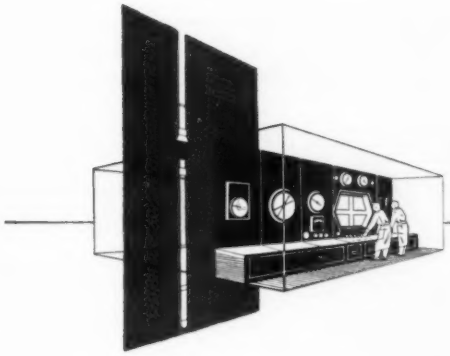
29 NEW HYSPEED WINCH designed to supply increasing demand for a lightweight, free-spooling tractor winch with fast line speeds and quick, positive brake action. A completely new D4 HySpeed winch can be mounted on either seat or fender tank-type Caterpillar D4 tractors. The new winch has many applications as a production tool, as well as for service, maintenance, and general utility. A few of the jobs it will perform are lifting, pulling, crane work, light pile driving, and ground skidding. *Hyster Co.*

IT'S NEW CHECK IT

30 NEW, FULL-REVOLVING DERRICK is available with either gasoline or electric power and can be swung by hand or power. Having a short tail swing and requiring no stiff-legs or guy lines, it occupies a minimum of ground space which permits it to be set up and to operate in congested areas. The rotating structure which supports the boom and boom-supporting members also supports hoisting machinery. Rotating structure is centered on a cast-steel turntable by means of a bronze-bushed center pin and is supported by four double-tapered, antifriction bearing rollers. Boom lengths of 20, 30, or 40 ft. are available with load capacities from 2,000 lb. at 40-ft. radius to 10,000 lb. at 10-ft. radius. This machine is particularly adapted for use at loading or unloading stations, for setting steel on construction jobs and for general utility work around industrial plants. *Clyde Iron Works, Inc.*

IT'S NEW CHECK IT

31 BAKER 9-X. Developed and proved in cooperation with Allis-Chalmers' tractor division, the big-capacity "no push-beam" bulldozer embodies a fundamental bulldozer design change. Made for the A-C HD-9, it adds to a line of equipment produced by Baker to match all four Allis-Chalmers crawler tractors. Only 96 in. wide,



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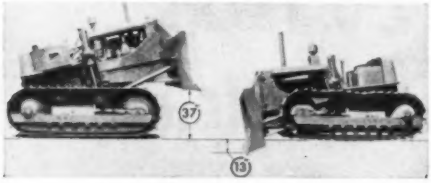
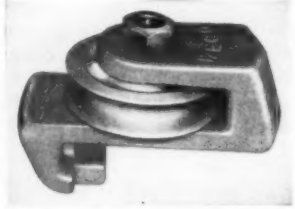


the 9-X can be transported over highways any time, without permits. Shorter coupling gives 9-X 17 per cent sharper "in-and-out" incline for pit and basement work. Lighter by 1,150 lb., it sells for about one-third less than standard blade. Direct mounting of 'dozer on engine frame, plus ingenious stabilizer bars (round bars showing in picture) and horizontal bearings, make the 9-X practical. *Baker Manufacturing Co.*

IT'S NEW CHECK IT

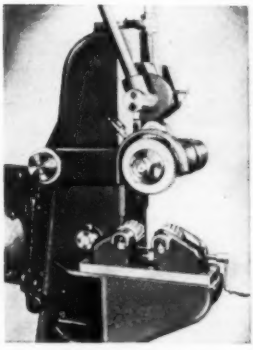
32 SIDE LINE BLOCK. Simplifies truck loading and saves wire line. This specially designed block which hooks onto the back corner of a truck permits pulling in or shifting a load at right angles to the truck without looping the line under the corner of the truck bed or resorting to makeshift methods of attaching a snatch block. It lies flat on the bed of the truck, with the hook or tongue hooked into slots which have been cut into the side of the truck frame and can be used on either side. When the block is in position, the line can be laid over the sheave, eliminating the time required for opening a snatch block or reeving up the line. Side block bodies are sturdy, one-piece castings, 1 in. thick with heavy reinforcing at hook and heel, points of greatest strain. The 6-in. sheave is forged steel, accurately machined and gaged for new wire-rope dimensions. Body is 11½ in. long and 4½ in. wide. The block weighs 43 lb. *Well Equipment Manufacturing Corp.*



IT'S NEW CHECK IT

33 SYNCROMOUNT POTENTIOMETER has long life and features a low torque shaft mounted in ball bearings. This shaft with runout and concentricity within .001 in. of the syncro-type mount enables this potentiometer to be driven directly in a precision computer gear train. Its small size, 1⅛-in. diameter, makes it ideal for applications where space is at a premium. It can be furnished with linear or functional output. The total resistance can be as high as 100,000 ohms and torque less than 0.2 in.-oz. *G. M. Giannini & Co.*

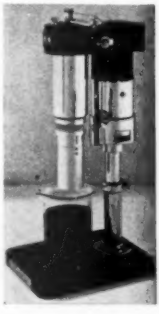
IT'S NEW CHECK IT



34 PIPE AND TUBE DESCALER AND CLEANING ATTACHMENT. A new pipe and tube descaling and cleaning attachment for Steen cutoff machines cleans rust, scale, paint, and other deposits off pipes, posts, and building columns. Sizes are available for cleaning pipes up to 12 in. in diameter. It is especially adapted for reclaiming used pipes and tubes. Most work requires only one pass through the rollers to completely remove all deposits. It feeds up to 20 ft. of pipe per minute making it suitable for both production work and intermittent use. *Continental Machine Co.*

IT'S NEW CHECK IT

35 FANN V-G METER, a new multispeed, portable viscosimeter, weighs only 9 lb. and may be operated from a 6-volt car storage battery. It is a rotational-type instrument with five speeds, electrically driven, permitting sustained rates of shear for any desired period of time. Its measuring system employs a motor-driven outer cylinder concentric with a stator. The fluid being tested occupies the annular space between the two, and when the outer cylinder is turned at a constant speed, exerts a torque on the stator which is proportional to the viscosity of the fluid. This torque is balanced to a null point by suspended weights. Models have straight-line calibration at all speeds. A calibration constant is determined for each speed, and converting the load in grams to centipoises becomes a simple calculation. Viscosity range of the instrument is from 1 to 150 cp.; gel strength 0 to 200 g. Fann V-G meters provide rotor speeds of 200, 300, 400, 500, and 600 r.p.m. *Geophysical Machine Works.*



IT'S NEW CHECK IT

36 AN ELECTRONIC SCANNING SYSTEM designed to automatically and continuously monitor up to 270 separate processing temperature points records only those temperatures which deviate beyond a preset limit. It includes an audible alarm that permits immediate correction of excess temperatures, and replaces the cost and use of several instruments and time-taking logging operations and maintenance. The new system is applicable for steam-generating stations and in the chemical, petroleum, and other processing industries. *Minneapolis-Honeywell Regulator Co.*

IT'S NEW CHECK IT

NATURAL GAS

A.G.A. Finale

Members told they are cutting their own throats when equipment requests lacking information are submitted

ST. LOUIS.—Members of the American Gas Association in the final session at its thirty-third annual meeting, held here October 15-17, were urged to give government agencies more complete and detailed information in making requests for equipment under CMP 26 of Petroleum Administration for Defense.

The need for more data was stressed at a panel discussion on how to expedite the gas industry business with government defense agencies. *(The Oil and Gas Journal, October 18, 1951, pages 76-77 for a report on other sessions of the A.G.A. meeting.)*

F. M. Banks, president, Southern California Gas Co., Los Angeles, was moderator of the panel which included the following members: Walter E. Caine, director, gas-planning division; A. Dale Green, director, gas-operations division; and Louis C. Sonnen, director, gas-facilities division of PAD; Justin R. Wolfe, former general counsel, PAD; and George H. Smith, assistant managing director, A.G.A.

It was explained that many requests for equipment and materials were delayed in processing because the government representative did not have from operators the full information required by the National Production Administration. It was explained that 12 consultants from the gas industry, scattered throughout the country, have been appointed to aid in these and related matters. The government representatives, most of whom are on leave from important positions with gas companies, also explained that forecast studies are now being made which will project the material needs of the gas industry for a period of 5 years.

Trained personnel needed.—The panel urged that gas companies do everything possible in making trained personnel available for government work. Smith explained that the facilities of the A.G.A. Washington headquarters are always available to operators in connection with defense activities.

Frederick O. Hess, president of Gas Appliance Manufacturers Association, Philadelphia, in one of the convention's principal addresses, urged that consideration be given to the construction of a number of coal-to-gas plants along the major pipe lines which would be used in taking care of the peak natural-gas loads.

Not enough gas.—"We do not have enough natural gas or gas lines in the East and North to solve the problems of disproportionate summer and winter supply," Hess explained in outlining his plan which he said would, in effect, make gas services available to additional millions of consumers throughout the year. He said the costs would be high but less than the expenditures in pipe lines required to serve these customers on a yearly basis.

How to meet the peak loads of the winter months was widely discussed informally at the meeting. Fenton H. Finn, vice president, New York State Natural Gas Corp. (Consolidated), emphasized the growing importance of field storage of natural gas adjacent to points of large consumption as a practical solution to the problem of taking care of peak requirements. He estimated that a half-billion dollars would be spent in these storage facilities over the next 3 years.

Storage estimated.—"The A.G.A. estimates that about 350 billion cubic feet of natural gas is now stored in this manner, an amount equal to about one-fourth of the annual residential gas consumption in the entire United States," Finn explained.

Eight members were elected to the membership of the managing committee of the natural-gas department of the association. They are: Don E. Herringshaw, Consumers Power Co.; Claude A. Williams, Transcontinental Gas Pipe Line Corp.; Arthur F. Bridge, Southern Counties Gas Co.; J. J. Hedrick, Natural Gas Pipeline Co. of America; E. L. Rawlins, Union Producing Co.; A. H. Weyland, Arkansas Natural Gas Corp.; Frank C. Smith, Houston Natural Gas Corp.; and E. F. Schmidt, Lone Star Gas Co.

Texan Promises New Levies If Gathering Tax Is Blocked

AUSTIN.—Gov. Allan Shivers made a flat promise recently that he will call a special session of the Texas Legislature to levy more taxes if attorneys for gas pipe-line companies carry out threats to tie up by court action collection of the new gas-gathering tax.

Shivers said that the state would be forced into the red if the $14,000,000 a year from the tax did not come into the general-revenue fund. This, Shivers said, he could not permit.

Most of the 181 members of the legislature are running for reelection. Under the circumstances, it would be extremely unwise for the pipe-line companies to force a special session, he said, intimating that a special session would be even tougher than the last one.

New Firm Buys Plant Site

TUSCOLA, Ill. — National Petrochemicals Corp., a new company recently formed by National Distillers and Panhandle Eastern Pipe Line Co., has purchased a 233½-acre site 3 miles west of here in Central Illinois. A $32,000,000 plant is planned, using light hydrocarbons from the Panhandle line as raw material. The first facilities to be constructed are understood to provide for hydrocarbon separation and ethylene manufacture. Purchase price of the site was reported at $187,000.

ATTEND A.G.A. MEETING.—At the thirty-third annual meeting of the American Gas Association in St. Louis. Left to right: John Merriam, president, Northern Natural Gas Co., Omaha; R. C. Frederick, chief of gas branch, Gulf Oil Corp., Pittsburgh; J. L. Parmelee, manager of exploration, Northern Natural Gas Co.; R. W. Camp, vice president, Consolidated Gas Utilities Corp., Oklahoma City, and Erich Larson, vice president, Gas Construction & Service Co., New York City.

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PIPE LINES

Gas to Northwest?

Glacier asks FPC o.k. on big system from Canada

WASHINGTON.—Glacier Gas Co., a subsidiary of Montana Power Co., Butte, Mont., has filed a proposal with the Federal Power Commission to build a 626-mile pipe-line system in the Pacific Northwest and to import gas supplies from southwestern Alberta in Canada.

The proposed project includes a main 285-mile 20-in. line from the international boundary northeast of Kalispell, Mont., to Spokane, Wash. A 120-mile, 16-in. line would be built from a point near Spokane southwest to Hanford, Wash. Glacier's system would also include a 91-mile, 8⅝-in. line from Spokane to Lewiston, Idaho, and a 130-mile, 12¾-in. line going north from Spokane to a point on the boundary south of Trail, British Columbia.

All gas imported would be drawn from Pincher Creek field in southwestern Alberta. The company said gas reserves there total well over 1 trillion cubic feet. Gas would be purchased from Westcoast Transmission Co., Ltd., at the boundary and would be redelivered to that company at the British Columbia terminus. Westcoast is now seeking authority from Alberta to export a maximum of 25 billion cubic feet of gas annually from Pincher Creek field.

Glacier did not estimate cost of the project. To get it approved, the company must get a presidential permit to import the gas, the FPC approval on the imports, and get permission to build the pipe-line system. The whole project would of course hinge on Canadian approval of Westcoast's export application.

Montana Power hearing.—Meanwhile, the FPC hearing involving the proposal of Glacier's parent firm, Montana Power, to import defense-essential gas from Canada for exclusive use of Anaconda Copper Mining Co. was accelerated when the commission ruled out the intermediate-decision procedure.

The decision, requested by Montana

SCURRY FEEDER LINE.—Crew lowers in a section of 4-in. lateral line for Pan-American Production Co. in Scurry County, Texas, area, prior to under-road crossing. W. L. Golightly, Houston pipe-line contractor, handled the work, with James P. Campbell serving as spread chief. Golightly has installed many of the small feeder lines and mains necessary to handle Scurry crude.

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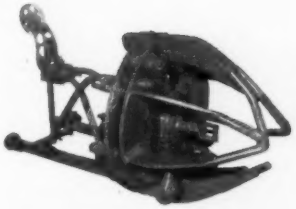

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Power and contested by coal, mining, and railway interests, means the case will go directly to the commission without a preliminary review and subsequent recommendation by a presiding examiner.

Imports up to 10 billion cubic feet per year for 5 years are being sought by the company and have been o.k.'d by the province of Alberta. Company attorneys said that an FPC denial of permission to import the gas would mean that it would have to discontinue service to Anaconda.

Work Starts on Imperial's Sarnia-London Line Section

WYOMING, Ont.—Construction of the 64-mile Sarnia-to-London section of Imperial Oil's Sarnia-Toronto products system began here last week.

Comstock Midwestern, Ltd., of Leaside, Ont., which holds contract for construction of the system, has completed stringing pipe along the right-of-way of the Sarnia-London section. Pipe gangs will work eastward from Wyoming to London and then link Sarnia and Wyoming. The section is scheduled for completion by December. The London-Toronto section and the spur line to Hamilton will be built next spring.

The system when completed will have an initial capacity of 39,000 bbl. per day. The first 132 miles from Sarnia to Waterdown, Ont., will be 12-in.; the 6-mile Waterdown-Toronto section will be 10-in.; while the spur from Waterdown to Hamilton will consist of two 6-in. lines.

Manufacturers Opens New Gas Line From Leidy Field

HARRISBURG, Pa.—Manufacturers Light & Heat Co. has opened its new 144-mile natural-gas pipe line connecting Leidy gas field of central Pennsylvania with Pittsburgh.

Initial capacity of the line is 100,000,000 cu. ft. of natural gas daily, but the $10,000,000 line will carry 150,000,000 cu. ft. daily at full capacity through use of added compressor facilities.

The new line runs from Liedy producing properties in Clinton County to a point near Canonsburg, Pa., where it connects with an existing line.

The Pennsylvania Public Utility Commission authorized the company to begin using the line October 11. It also authorized Manufacturers to build lateral lines to pick up gas in other counties through which the main line passes. The commission's order was conditioned, however, to require that the company furnish gas only in its present distribution area which is mostly in western Pennsylvania. The line is expected to relieve

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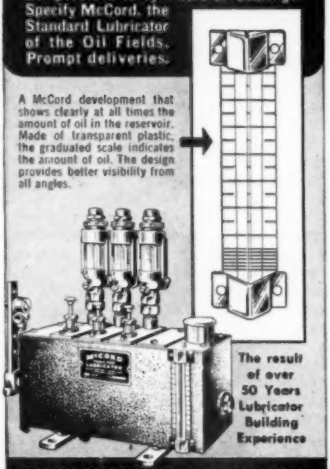

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Service Completes 123-Mile, 10-In. Texas Crude Outlet

FORT WORTH.—Service Pipe Line Co. has completed its new 123-mile, 10-in. crude outlet for production in Stonewall, Haskell, and Knox counties in West Central Texas.

The new line runs from Jud, Haskell County, to a connection with the company's trunk-line system at the pump station at Bowie, Montague County. Pipe for the line came from other parts of Service's 10,000-mile system. It was laid by Smith Contracting Corp. and O. R. Burden Construction Corp.

Two new laterals are now under construction. One, a 19-mile, 6-in. line, will connect South Haskell pool in Haskell County with the Jud-Bowie line. Contractor, Gaasch Construction Co., Brownfield, Tex., has completed about 90 per cent of the welding.

The second lateral, a 14-mile, 6-in. line to connect North City pool, is about 50 per cent completed. Jim J. McCormick Construction Co., Wichita Falls, Tex., holds contract.

Smith Contracting has started work on a 15-mile, 10-in. section of a 10 and 8-in. line from Service's Old Glory station in Stonewall County to Cogdell station in Kent County. Pipe for the remaining 39 miles of the line is scheduled for delivery in the first quarter of 1952.

Construction has been started in New Mexico by Crosley and Hardy of a 25-mile, 10-in. line to connect Denton pool in Lea County with Service's Wasson station in Yoakum County, Texas. Denton pool operators anticipate considerable development in the next few months. The company laid a 4-in. line to the pool in October 1950.

Sohio Lets Contract for Refinery-to-Terminal Line

CLEVELAND.—Standard Oil Co. (Ohio) has let contract for construction of 17 miles of 6-in. pipe line from its Toledo refinery to its big new terminal at Hill and Westwood, Ohio, to Wabash Contracting Co., Inc.

Permits from Lucas County and the city of Toledo and right-of-way from private-property owners have been obtained. Sohio has available a sufficient quantity of pipe to build the line and expects to complete laying operations this year.

The line is the final link in the company's expanded marketing facilities in the Toledo area. The new terminal, expected to be ready for operation prior to completion of the laying of the line, initially will have 115,000 bbl. of storage capacity.

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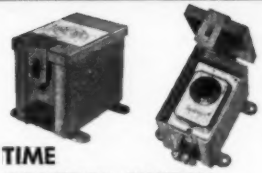

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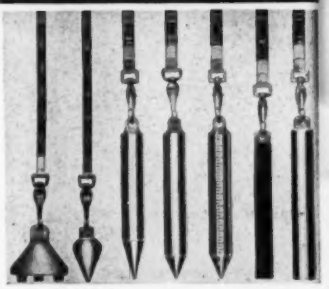

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3,000-Mark Passed in Operating Rotary Rigs

Operating rotary rigs in the United States and Canada passed the 3,000 mark during the week ended October 15 (latest survey) and set the new "high" in activity at 3,043 rigs. The total was an increase of 50 rigs during the week, all being in the United States. Western Canada drilling operations remained unchanged at 165.

New all-time highs in number of operating rigs were established in the West Texas-New Mexico, Oklahoma, and Rocky Mountain areas. In the West Texas-New Mexico area, the number of active rigs passed the 1,000 mark for the first time, due primarily to the rapidly spreading development on the Spraberry trend.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 10-15-51	Change week ended 10-8-51	Change week ended 10-16-50
Gulf Coast	617	+16	+82
W. Tex.-N. M.	1,006	+14	+192
Ark.-N. La.-E. Tex.	171	— 1	+ 30
Oklahoma	345	+ 9	+ 58
Kansas-S. Nebraska	189	— 1	+ 47
Illinois-Eastern	156	— 2	— 9
Rocky Mountains	209	+ 8	+ 84
Pacific Coast	185	+ 7	+ 47
Total U. S.	2,878	+50	+551
Western Canada	165	0	+ 39
Total	3,043	+50	+590

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are show on pages 186 and 187.

Hinkle Drilling Co. is the contractor on a projected 11,000-ft. wildcat test which Cities Service Oil Co. is starting at 1 Underwood, in the F. Fuchs Survey, 6½ miles west of Sheridan, in Lavaca County, South Texas.

B. F. Allison Drilling Co., Casper, Wyo., has moved a rig to a wildcat location north of Ft. Laramie, Goshen County, Wyoming, where it will drill for Continental Oil Co. at 1 Parsons, NW NW NW 35-28n-62w.

Colorado - Wyoming Drilling Co., Casper, Wyo., has a rig working for Gifford Parker and J. G. Dyer on a wildcat test, 1 Kirchoff, in the Greeswood area, in Weld County, Colorado. Location is in the C SE NW 12-6n-61w.

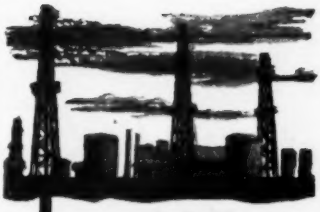
Frontier Drilling Co., Denver, has taken on a contract for a wildcat to be drilled for Klamath Oil Co. in Musselshell County, Montana. Location is in the C NE 3-10n-30e.

Denver Basin Drilling Co. is drilling for Landauer & Kennedy at 1 State, C SW SW 36-6n-55w, an extension test in the Messex area, Morgan County, Colorado.

Thompson & Harris, Cushing, Okla., will drill for Republic Natural Gas Co. at 1 Big Bend, NW NE SE 21-25n-3e, an outpost test in the Big Bend field area, Osage County, Oklahoma. Hole is projected to 2,800 ft.

Pennant Drilling Co. has a rig working for The Texas Co. in the

TOUR CHANGE.—Daylight and evening drilling crews of Nichols Duncan Drilling Co., Duncan, Okla., contractor on a Skelly Oil Co. operation in the Fox-Graham field, Stephens County, southern Oklahoma. Left to right: O. D. Gray, L. H. Gentry, Buddy Harris, R. W. Pennington (day driller), T. N. Youree, Clinton Flynn, E. C. Davis, T. B. Briscoe, and E. T. Hill (evening driller).



You will pull fewer drill strings because of joint failure if you use 'Bestolife Lead Seal Tool Joint and Casing Compound. Standard of the oil industry for 20 years. Unconditionally guaranteed. Sold and exported by supply houses throughout the world.

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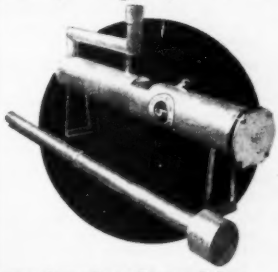

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Flash-back positively prevented by built-in flame arrester. "Wild" gas entering the heater must burn inside the combustion chamber or choke the flame out.

Self regulating — tamper proof. Will smother flame above pre-determined safe temperature.

At maximum temperature, surface will not ignite combustible fluids including gasoline.

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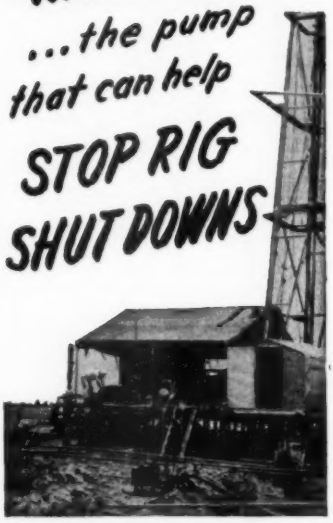
that can help
STOP RIG
SHUT DOWNS

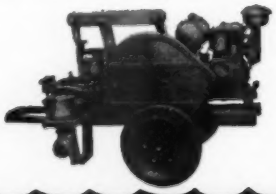


With this famous diaphragm pump on the job you don't need to shut down your rig to clean cuttings from pits, mix muds or pump water. What's more, your slush pump is free to stay on its profit-producing job — circulating drilling mud.

At your rig a Marlow "Mud Hog" can:

Eliminate jets to clean pits
Reduce costly drilling-mud loss to waste pit
Cut down water loss to waste pit
Mix mud and feed slush pump directly . . . eliminate unused mud at slush pump suction
Transfer water from waste pit
Supply water at low pressure

A Marlow "Mud Hog" is the unrivalled "tough baby" of the oil country. Write for complete details about this dependable money-saving pump.



MARLOW PUMPS
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RIDGEWOOD, NEW JERSEY
Engineers and Representatives Everywhere

Fiddler Creek field, in Weston County, Wyoming. Current operation is at 1 Moore, C SE SW 11-46n-66w.

Gordon Drilling Co. is drilling on a Cambrian exploratory test on the Wilson Dome, Natrona County, Wyoming. Contract for 4,500 ft. is with Frank Morgan. Location is on the operator's McCarthy lease in the SW SE NW 5-37n-83w.

Will I. Lewis, Mt. Vernon, Ill., is the contractor on a wildcat test which Carter Oil Co. is starting on its Burke Ranch unit, in Natrona County, Wyoming. Location is on state land in the SW SE SE 36-37n-79w.

Marken & Grannell tools are drilling for The Texas Co. at 1 Watson, a Madison-Devonian exploratory test in the Maria River Nose area, Pondera County, Montana. Location is in the SE NW NE 14-31n-5w.

Decem Drilling Co., Oklahoma City, has taken a 12,500-ft. contract from Carter Oil Co. calling for a Simpson test to be drilled at a wildcat location in the C NW SW 32-2n-3w, southwest of Foster, Garvin County, Oklahoma.

Tilly Drilling Co., Wewoka, Okla., has the contract for a projected 3,700-ft. wildcat test which Arthur Finston will drill at Kibby, NW NW NE 28-8n-9e, a mile north of the old North Holdenville pool, now abandoned, in Hughes County, Oklahoma.

Peel Brothers, Hoisington, Kans., will drill for White Eagle Oil Co. of Tulsa at 1 Randy, NW SW SE 21-14-18, a projected Arbuckle test 3 miles south of Hays, Ellis County, Kansas. Hole is projected to the Arbuckle, expected at 3,650 ft. Location is 3½ miles from other production.

Penrod Drilling Co. is drilling another well in the Lismore Landing field, Concordia Parish, eastern Louisiana, for H. L. Hunt and Gulf Refining Co. as joint operators. The new well is 6-E Fisher, C NW SW 15-6n-7e.

Webster Drilling Co., Tulsa, has been awarded the contract for another well which Sterling Oil Co. of Oklahoma City will drill in the area of the recently opened Northeast Spring Valley pool, Garfield County, Oklahoma. The new operation is 1 Shawver, C NW NW 5-22n-4w, 1½ miles southwest of the discovery well, completed as a Mississippian gas-distillate producer. The rig which the contractor will use at present is drilling at 1 Schroeder, C SW SE 29-23n-4w, a west offset to the discovery well.

Paul English is the contractor on a projected 8,100-ft. exploratory test which Glen M. Ruby is starting in the Big Flat area, Grand County, Utah. Location is in the SE NW NW 11-26s-19e.

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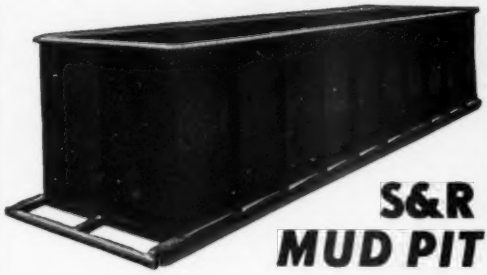

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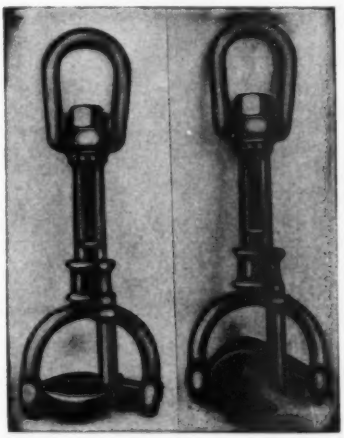

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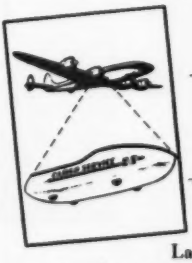

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REFINING

DPA Authorizes Fast Tax Write-offs on New Plants

WASHINGTON.—Certificates of accelerated amortization have been issued by the Defense Production Administration for four more sulfur projects, exempted from the 60-day holdup of certificates because of the urgent need for additional production.

The largest project will be a $1,498,000 facility for production by Phillips Chemical Co. at Funica, N. M. The other certificates cover a $195,500 investment by Shamrock Oil & Gas Corp., at Sunray, Tex.; $198,990 by Mathieson Chemical Corp., at McKamie, Ark.; and $320,000 by Sinclair Refining Co. at Marcus Hook, Pa. All certificates provide for rapid writeoff of 80 per cent of the investment.

At the same time, DPA announced additional oil-expansion projects initiated between January 1 and September 23, 1950, which were approved before the September 23 deadline.

The amounts for which accelerated amortization was provided for these projects was not disclosed. They include facilities for petroleum products by Esso Standard Oil Co. at Bayonne, N. J., granted 50 and 75 per cent amortization; gasoline facilities by the Warren Petroleum Corp., at Maysville, Okla., 50 per cent; propane, butane, gasoline, and diesel fuel production by Shamrock Oil & Gas Corp., at Sunray, Tex., 50 per cent; and propane, butanes, gasoline, and diesel fuel by Food Machinery & Chemical Corp., also at Sunray, 50 per cent.

Cities Service' Orthoflow Cracker on Stream Soon

PONCA CITY, Okla.—Cities Service Oil Co. will begin circulation of catalyst by the middle of November in its new Orthoflow cracking unit now under construction here.

The 8,350 bbl. per day fluid catalytic cracker is the first of its kind to go on stream in the United States. It is one of the major elements in a multimillion-dollar expansion begun last February at the refinery, which will enlarge plant capacity to 20,000 bbl. of crude per day. The cracker's design and installation is under contract to M. W. Kellogg Co.

In addition to the construction of the cracker, the refinery's crude-vacuum unit at the refinery is being revamped to boost its capacity from the present 15,000 to 20,000 bbl. per day. A new cooling tower is being installed, and the refinery's waste-disposal system is being extended and modernized.

Two new 80,000-bbl. tanks also are being installed at the plant, plus a 80,000-lb. per hour steam generator and a hot lime soda and external phosphate water-treating unit. These facilities will also be completed about

Greasing Canada's Defense Machinery

Tankage shown here forms an integral part of one of the world's most modern lube and grease manufacturing plants. The $2,000,000 unit, just completed by Canadian Oil Companies, Ltd., on the St. Lawrence River at Montreal, was officially opened this week. It is a part of $22,000,000 expansion program highlighted by a new $18,000,000 refinery now being built near Sarnia. The plant houses Canada's first oil homogenizer in addition to the country's first grease colloid mill—one of the few such units in operation anywhere. Its oil-canning line is the fastest in Canada, capable of filling and packaging 18,000 qt. of motor oil alone in an hour. A pilot-plant miniature of the grease-manufacturing setup enables manufacturing methods for different greases to be worked out from laboratory formulas before full-scale production begins. Tankage capacity is about 95,000 bbl.

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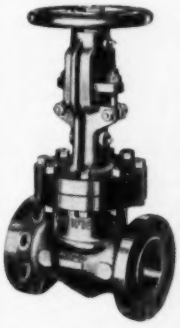
For general refinery supplies in the mid-continent area, call the WORDS at 5-0132, Tulsa.



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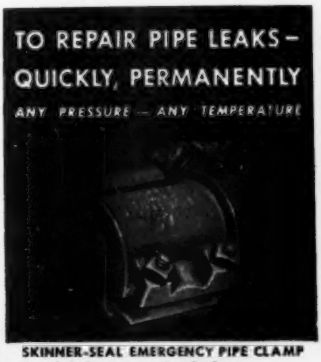
ANY PRESSURE — ANY TEMPERATURE



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the middle of November. Plant buildings will be expanded, and a new laboratory is going up. Some of the secondary construction is expected to extend well into next year because of materials shortages.

Mercury Launches Program To Triple Plant Capacity

OKLAHOMA CITY.—Mercury Oil Refining Co. has launched a $3,195,000 construction and expansion program at its refinery here which will more than triple plant capacity.

New facilities include a new fluid catalytic cracking plant, a gas-concentration and polymerization unit, and all auxiliary equipment, according to E. O. Derrick, vice president and general manager of the firm. They will increase Mercury's capacity from the present 3,150 to 10,000 bbl. per day.

The program has been issued a certificate of necessity by the National Securities Resources Board, and the steel allocation has been approved by the Petroleum Administration for Defense.

New facilities are already under construction by Refinery Engineering Co., Tulsa, which expects to complete construction by this time next year. They will be geared to production of high-octane aviation gasoline and jet-engine fuel.

Storage capacity of the refinery will be increased by 565,000 bbl.

Sun Observes Marcus Hook Plant's Fiftieth Birthday

PHILADELPHIA.—The fiftieth anniversary of the founding of Sun Oil Co.'s Marcus Hook, Pa., refinery is being celebrated here this week. The 140,000-bbl. per day plant, ninth largest in the nation, had its beginning when construction commenced October 25, 1901, on a 82-acre site along the Delaware River southwest of the city. In March of the next year, first crude was brought to the new plant by tanker from the Texas Gulf Coast.

The plant today covers an area of 1,900 acres and employs 5,000 workers, producing over 400 different petroleum products. The refinery is currently receiving $20 million worth of new equipment and units. Soon to be built is a Houdriformer which will produce aromatic-rich reformate, and a commercial unit of the new Sun-developed Arosorb process which will separate the reformate stream into benzene, toluene, and aromatic aviation-gasoline blending stock.

Lubricating-oil output at Marcus Hook is scheduled to be greatly expanded by construction of facilities for producing over 8,300 bbl. per day of finished products. Other facilities to be added at the refinery include a propylene-polymerization unit.

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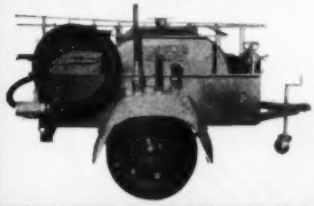
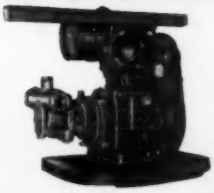
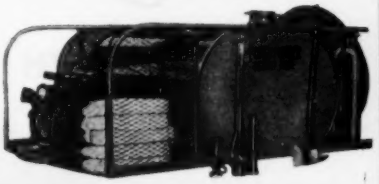




Porto Pump

Pallet Model Porto-Pumper



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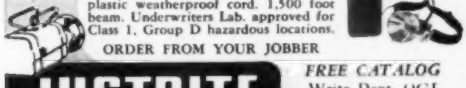

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The unique design which enables the Security Casing Scraper to cut on the up stroke also provides additional scraping life to each cutter. Every tooth has *two* cutting edges that share the scraping job, and the wear is not concentrated on one side of the tooth. The cutters are spring loaded to exert positive pressure on the walls of the casing even after the teeth become worn. The cutter blocks, when completely worn, may easily be rotated 180°, providing a new set of double-edged teeth for efficient cutting.

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REPORTS ON

Exploration and Drilling

The Ouachita Folded Belt

IT was forcibly brought out at the Austin meeting of geologists* last week that the mysteries of the Ouachita folded belt are not just of academic interest. Correct answers to the complicated structural, stratigraphic, and petrologic problems of this belt are being sought to find oil.

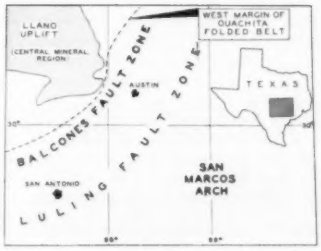
As exploratory drilling goes deeper and deeper and the acreage situation becomes tighter and tighter, the little-understood Ouachita system grows in importance.

This enigmatic, 50 to 100-mile wide, deformed belt winds for 1,300 miles from the northeast corner of Mississippi northward and westward across southern Arkansas, southwestward across southeastern Oklahoma, southward to the Llano uplift of central Texas, and thence westward to the Marathon Mountains at the Mexico border.

Rocks of this pre-Cretaceous geosyncline crop out in the Ouachita Mountains of Arkansas and Oklahoma and the Marathon Mountains of Southwest Texas. The remainder of the system is buried beneath post-Paleozoics of the Gulf Coastal Plain. Though the two outcrop areas are far apart they show nearly all of the same units, and rocks recovered from wells drilled into the pre-Mesozoic sediments along the buried portion of this belt can be matched with those in the mountains.

Rocks of the Ouachita system are rather generally believed to be geosynclinal deposits (perhaps from a land mass to the south, perhaps from pulsating mountains within the geosyncline itself) in contrast to the foreland deposits (Arbuckle facies) of the same ages to the north and west of the belt.

The dividing line between the two distinct facies is so sharp in some localities of the Ouachita Mountains that many who have studied the problem believe that the Ouachita rocks have been thrust many miles (up to 100 miles, perhaps) over Arbuckle-type rocks along low-angle faults. These geologists believe that it is possible to drill through the tight Ouachita rocks to the porous Arbuckle facies. Their big problem is finding a means to scientifically locate wildcats in this distorted blanket. Other geologists believe that the Ouachita rocks travelled only moderate distances (a mile or so, perhaps) to reach their present positions and that any oil found in the province will be from Ouachita-type rocks. The time may not be far distant when this still-debatable question will be checked carefully with the drill.



San Marcos arch.—For many years it has been believed that a broad arch formed prior to Cretaceous time runs southeastward at right angles to the Balcones fault zone (see map) between the Llano uplift and the coastline.

The arch was originally postulated on the basis of thinning of Cretaceous rocks near the southeastern portion of the Llano uplift and has had support due to the lack of salt domes in a broad belt lying between the north and south salt-dome areas of the Texas Gulf coast.

In a paper entitled "Is There a Pre-Cretaceous San Marcos Arch?," Paul Weaver showed that the results of magnetic and gravity surveys made to the east and south of the Llano uplift show no definite indication of the presence of an arch at right angles to the uplift, but rather tangential trends. Weaver suggested that the thinning of the Cretaceous may have been caused by a local shelf condition rather than by an extensive progressive uplift that ran to the coast. He explained away the lack of salt domes by pointing out that this does not necessarily mean the lack of salt. Weaver also pointed out that post-Cretaceous contours along coast show little indication of an arch.

When a previous skeptic about the existence of the arch said that some of the very reasons Weaver used to suggest that no arch existed had convinced him that an arch was present, Weaver confessed that he was asking for contrary ideas instead of support. So goes the inexact science of geology. *Philip C. Ingalls.*

*Eighteenth annual meeting of the South Texas Geological Society and the 1951 regional meeting of the American Association of Petroleum Geologists, October 18-20. See news section for report of address given at meeting by Wallace E. Pratt.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

OKLAHOMA.—Carter Oil Co. appears to have discovered an Arbuckle lime reservoir in the recently revived West Noble pool in McClain County. A 60-minute drill-stem test yielded 265 ft. of 35°-gravity oil and 15 ft. of oil-cut mud from a 16-ft. zone at 9,200 ft.

ROCKY MOUNTAIN AREA.—In North Dakota, Amerada Petroleum Corp. has found a total of 133 ft. of effective pay in the Madison at its 1 Dillard, Beaver Lodge extension well, and found very slightly gas-cut mud on test at the 1 Risser, Croff area wildcat. Shell Oil Co. 1 Pine Unit is an apparent new discovery in the Denver-Julesburg Basin area of Colorado.

WEST TEXAS.—Moore Exploration 1 Dowlen-Houpt, Midland County deep test, had flowing oil on drill-stem test in top of Devonian. Oil and water started spraying in 90 minutes and continued until end of test. Northeast of Midland, Blackwood & Nichols Hofferkamp was flowing high-gravity oil from lower Pennsylvanian. In northeast Howard County, Lloyd Smith 1 Boyd had discovery or extension reef production at 7,650-70 ft. Potential test rated 215 bbl. of oil in 24 hours through 12/64-in. choke.

Oklahoma

Arbuckle Oil Production Indicated at West Noble

DISCOVERY of an Arbuckle lime reservoir in the recently revived West Noble pool, in McClain County, on the eastern rim of the Anadarko basin, appears to have been made by Carter Oil Co. in its 3 Johnson, C NW SE 30-8n-2w. The well cored Arbuckle from 9,191 ft. to 9,207 ft., recovering 16 ft. of sand, dolomite and lime with staining and odors. A 60-minute drill-stem test of the zone yielded 265 ft. of 35°-gravity oil and 15 ft. of oil-cut mud. Flow pressure gaged 545 psi.

The well is at a location north of Carter's 2 Johnson, which recently reopened the pool with discovery of production in the Oil Creek sand, opposite which casing was pefforated at 8,967-9,010 ft. The latter well also had promising oil showings in the shallower McLish sand. The pool's discovery well, 1 Johnson, was completed in 1944 in the Bromide pay at 8,190-8,210 ft. It produced only a short time, and until recently no other development has been undertaken.

McClain County has another prospective discovery, either a new pool or a mile southwestward extension of the Southwest Wayne pool, where Sinclair Oil & Gas Co. got a good gas flow and recovered 240 ft. of heavily mud-cut oil in a drill-stem test of Hart sand at its 1 Bennett, NW SE NW 21-5n-2w. Sand was topped at 6,863 ft. The test took in an interval at 6,899-6,935 ft. The area is about 8 miles southwest of Purcell.

Additional good gas-distillate showings

have been found by Pure Oil Co. in its 1 Akbert, SE SE SW 16-5n-26eCM, rank wildcat test 3 miles northwest of Knowles, northeastern Beaver County, in the Panhandle. Latest showings were in the Mississippian Chester zone, where, in a 60-minute drill-stem test at 6,710-74 ft., the well flowed at an estimated rate of more than 8,000,000 cu. ft. of gas daily and yielded 270 ft. of gas and distillate-cut mud in the breakdown. Indicated bottom-hole pressure while flowing was 950 psi. Flow was through ⅜-in. top and ½-in. bottom-hole chokes. Previous showings were in a basal Pennsylvanian sand at 6,040-6,142 ft.

Extension of the Light Ranch gas-distillate field in Beaver County is virtually assured by results of production tests so far in J. M. Huber Corp. 1 Heintz, C SE SW 15-6n-21eCM. Latest reported test was from casing perforations in Morrow sand at 6,009-28 ft., where the well flowed an estimated 9,000,000 cu. ft. of gas per day through 28/64-in. choke. The test also showed considerable distillate but no gage was taken. Flowing pressure was 1,400 psi. on the tubing and 1,475 psi. on the casing. Total depth is 6,330 ft. with 7-in. casing on bottom. Location is ½ mile southeast of production.

Indications of Springer sand production have been given in the West Boyle field, Stephens County, where Dick Wegener got a good gas and oil flow in a drill-stem test in that prospective pay zone. Top of the Stringer sand was logged at 6,950 ft. The test took in an interval at 6,953-7,008 ft. Gas started to flow in 9 minutes. Oil flow, starting in 57 minutes, was estimated at 30 bbl. per hour. Flow was through ⅝-in. top and ½-in. bottom-hole chokes. Gravity of the oil was 34°. Hole is being cored ahead. Present production in the field is from Deese sand at 5,400 to 5,800 ft.

Randall Morton and D & L Oil Co. appear to have uncovered a new Simpson pool in Noble County where their 1 Marshall, NE NE NE 28-22n-2e, has casing run for production tests. Total depth is 4,625 ft. A 60-minute drill-stem test at 4,572-86 ft. got a good gas flow, starting in 14 minutes, and filled 2,000 ft. of oil, 60 ft. of oil-cut mud, and 660 ft. of water. Casing was run through the zone.

OKLAHOMA SUCCESSFUL WILDCAT

Carter County: Stanolind Oil & Gas 1 Mills, SE NE SE 17-2s-3w, pumped 35 bbl. oil from Tussy at 5,308-14 ft., TD 6,340 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Beck—Davenport Drilling 1 Stumblin Bear, NW NW NW 23-4s-11w, dry, TD 2,330 ft.

Lincoln County: Lee Oil 1 Long, SE SW SW 17-13n-5e, dry, TD 5,135 ft.

Noble County: Howell & Howell, Sinclair et al 1 DeVore, SW SE SE 17-24n-13, dry, TD 4,556 ft.

McCaughey et al 1 Curby, NW NW NE 19-24n-1w, dry, TD 4,668 ft.

Pontotoc County: Kollsman 1 Brumley, NE SW SE 18-4n-8e, dry, TD 4,650 ft.

Pottawatomie County: Halko 1 Pybas, NW NW NW 6-6n-3e, dry, TD 5,276 ft.

Deep Rock 1 Ford, NE SW SW 8-6n-3e, dry, TD 4,855 ft.

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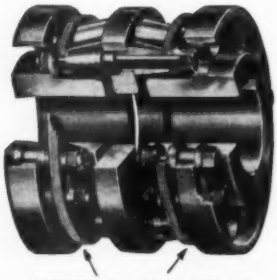

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Stanolind Oil & Gas 1 Matley, SW SE 3-7n-3e, dry, TD 5,239 ft., geological test in NE Moral.

Evans and Sunray Oil 1 Leader, SE SE SW 13-9n-2e, dry, TD 5,269 ft.

Seminole County: Kingery-Patterson 1 Dixon, NW SW SW 32-9n-7e, dry, TD 3,455 ft.

Stephens County: Ryan Oil 1 Tussy, NE SE NW 24-1n-4w, dry, TD 5,910 ft.

Peppers et al 1 Pepper-Hefner, NE NW NE 10-2n-8w, dry, TD 9,250 ft.

Kansas

Tests Show Small Well In Gove County Wildcat

PORTABLE pumping equipment is being set up for further testing of Herndon Drilling Co.'s prospective discovery well in southern Gove County, western Kansas. Latest swabbing tests, made with casing perforated at 3,670-73 ft., produced at the rate of 5 bbl. of fluid per hour with oil estimated at 50 per cent.

The well is 1 Jasper, NE NE NE 30-15-29. Location is about 8 miles southwest of the Coberly pool, the county's first production, opened earlier this year. The Herndon well, if successful, will open the county's third pool. Coberly produces from the Marmaton.

Prospective pay zone is the Lansing-Kansas City lime section topped at 3,636 ft. (—1,086 ft.). Hole was drilled to the Mississippian at a total depth of 4,324 ft., but no shows of importance were found below the former formation. Prior to perforating casing at 3,670-73 ft., operators had tested intervals at 3,928-30 ft. and 3,877-80 ft., getting some oil and water.

Skelly Oil Co. and Gulf Oil Corp. 1-C Theis, SW SW NE 1-34-26, a wildcat in the McKinney gas-distillate producing area, Meade County, in the southern part of the state, flowed at an estimated rate of 5,606,000 cu. ft. of gas per day in initial production tests of its prospective Mississippian pay zone, open at 5,792-5,910 ft. Formation was treated initially with 3,000 gal. of acid. Addition of 12,000 gal. of acid did not improve production.

Victor Drilling Co. 1 Bowman, NE NE SE 27-20-15, a mile south of the Bergtal pool, southwestern Barton County, filled 1,250 ft. of oil and 450 ft. of water in 15 hours after drilling plug, and then swabbed 3¼ bbl. of net oil per hour for 3 hours from 550 ft. off bottom. Total depth is 3,676 ft. in Arbuckle lime, topped at 3,662 ft. (—1,725 ft.). Hole is open below 3,663 ft.

Production of the Palco pool, southwestern Rooks County, is being extended ¾ mile to the southwest where Brooks Hall 1 Holmes, SE SE NW 7-10-20, produced at the rate of 35 bbl. of oil per hour for 4 hours in initial swabbing tests. Pay zone is Arbuckle lime, topped at 3,859 ft. (—1,592 ft.), and open at 3,860-62 ft.

Rocket Drilling Co. 1 Kramer, SE SE SE 7-14-19, a mile south of the Irvin pool, Ellis County, swabbed an average of 2¼ bbl. of oil per hour for 8 hours after pay zone was treated with 500 gal. of acid. Its Arbuckle pay zone is open at 3,834-41 ft. Top is 3,832 ft. (—1,614 ft.).

KANSAS SUCCESSFUL WILDCATS

Rooks County: Sidey 1 Eckert, NW NW SE 5-8s-17w, pumped 355 bbl. oil from Arbuckle at 3,311-13 ft., TD.

Westgate-Greenland 1 Sweet, NE NE SE 18-8s-18w, pumped 7-10 bbl. oil from Arbuckle at 3,423-62 ft., TD 3,489 ft., old dry hole plugged back.

KANSAS WILDCAT FAILURES

Barton County: Atkins 1 Asher, SE SE SW 22-20s-14w, dry, TD 3,611 ft.

Chautauqua County: National Associated Petroleum 1 Lowery, NE NW SE 17-34s-9e, dry, TD 2,611 ft.

Decatur County: Gore 1 Brock, SW SW SW 22-4s-26w, dry, TD 4,085 ft.

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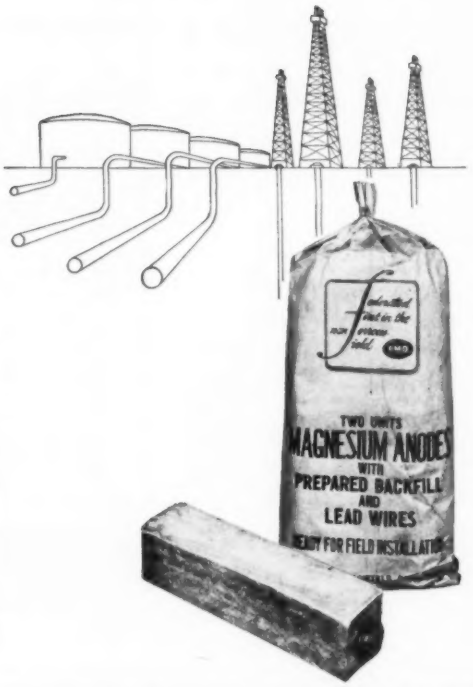

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Ellsworth County: Pool 1 Kopa, SE SE NW 28-14s-10w, dry, TD 3,300 ft.
Gove County: Musgrove 1 Losey, SE SE SW 11-13s-30w, dry, TD 4,730 ft.
Graham County: Deep Rock 1 Brault, SW SW SW 11-7s-22w, dry, TD 3,860 ft.
Finston & Murfin 1 Kirkpatrick, SE SE SW 26-8s-22w, dry, TD 3,841 ft.
Champlin 1 McGuire, NW NW NW 8-10s-25w, dry, TD 4,561 ft.
Norton County: Gore 1 Brooks, NE NE NE 9-4s-25w, TD 3,905 ft.
Pratt County: Iron Drilling—Brooks Hall 1 Frisbee, SW SW SE 21-26s-13w, dry, TD 4,551 ft.
Iron Drilling 1 Rezeau, NW NW SW 12-28s-15w, dry, TD 4,799 ft.
Rooks County: Jones-Shelburne & Farmer 2 Lynd, SW SW SW 32-9s-19w, dry, TD 3,820 ft.
Saline County: Vishneske 1 McCormick, SE SW SW 34-14s-4w, dry, TD 3,696 ft.
Trego County: B & R 1 Rhoden "A," SW SW NE 25-12s-23w, dry, TD 4,516 ft.
Woodson County: Derby 2 Holmquist, NW SE NW 15-24s-14e, dry, TD 1,701 ft.

H. O. Prideaux, SPRR Sur., 3 mi. SE Antelope, TD 3,610 ft., pay 3,568 ft., flowed 105 bbl. 41°-gravity oil, 14/64-in. choke, TP 950 psi., GOR 600 cu. ft.
Jones County: Roark, Hooker & Roark 1 J. C. Williams, BBB&C Sur. 204, 4 mi. NW Lueders, TD 2,311 ft., perf. Hope lime 1,881-98 ft., flowed 1,139 bbl. 40°-gravity oil, ¾-in. choke, TP 100 psi., GOR 300 cu. ft.
Nolan County: Seaboard Oil Co. 1 Billie Hanks, 28-Z-T&P, TD 6,363 ft., elev. 2,481 ft., perf. Pennsylvanian 5,545-60 ft., flowed 383 bbl. oil, ¼-in. choke, TD 620 psi.
Stephens County: Panhandle Producing & Refining Co. 1 S. G. Copeland, Blk. 1,080, TE&L Sur., 6 mi. SE Ivan, TD 4,265 ft., elev. 1,200 ft., Caddo 3,807 ft., pay 3,960 ft., pumped 10 bbl. oil.
Sorrels Oil Co. 1 E. G. Plumb, 38-7-T&P, TD 4,075 ft., Bond sand 3,674 ft., flowed 24 bbl. 43°-gravity oil, ¾-in. choke.
Wichita County: Frank Wood, Inc. 1 Wichita Water Improvement, Robert Evans Sur., 5 mi. W Wichita Falls, TD 4,344 ft., pumped 56.7 bbl. 43°-gravity oil.
Wilbarger County: Frank Wood 1-TT Waggoner, 40-4-H&TC, TD 1,925 ft., pay 1,921 ft., pumped 20 bbl. 39°-gravity oil.
Wise County: Signal Oil & Gas Co. et al 1 J. B. Burns, B. F. Banks Sur., ¾ mi. S Cottondale, TD 7,503 ft., elev. 814 ft., Ellenburger 6,881 ft., open-hole pay 6,912-7,000 ft., 13,000,000 cu. ft. gas, 45 bbl. distillate per 1,000,000 cu. ft.
Young County: Champlin Refining Co. 1 D. D. Strange, Blk. 6, Vaughn Subd., A. Robus Sur., TD 3,572 ft., pay 3,564 ft., flowed 146 bbl. 42°-gravity oil, ¼-in. choke, TP 100 psi., GOR 950 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Continental Oil Co. 1 Perkins, 48-A12-Bell CSL, dry, TD 5,455 ft., elev. 1,207 ft., Mississippian 5,156 ft., Ellenburger 5,362 ft.
R. C. Dublin 1 T. B. Wilson fee, Sec. 12, H&TC, dry, TD 1,643 ft.

North Central Texas

Montague County Well Said Flowing 60 Bbl. Per Hour

WICHITA FALLS.—Engle Petroleum Co. 1 Frank Collier, Montague County discovery in J. Collier Survey, had not been completed at last report, but unofficial sources indicated the well flowed oil at the rate of 60 bbl. an hour after setting casing and perforating just below 6,450 ft. Local interests hold the new well to be one of the county's major discoveries, although some geologists believe the first well is somewhat off structure and that further drilling will uncover better pay sections. The 1 Collier had formation water on several of its drill-stem tests.

A conglomerate discovery was in prospect at Dan Auld 1 C. E. Boyd, 46-D-H&TC, Stonewall County wildcat 5 miles southeast of Aspermont. A 25-minute drill-stem test from 6,032-50 ft., total depth, had flowing oil in 19 minutes. Recovery in the pipe was 1,720 ft. of clean oil, plus 30 ft. of mud and oil. Operators were running casing to top of pay for completion. Location is 2 miles south and slightly west of Boyd field.

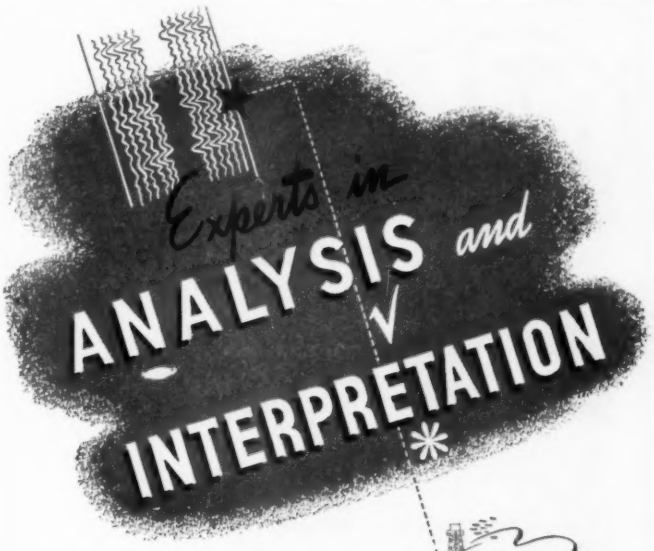
In Wichita County, R. C. Underwood 1 Ruben Parish developed 40 ft. of gas and 25 ft. of gas-cut mud on a drill-stem test from 4,050-80 ft. It was scheduled to 5,200 ft. and was near that depth at last report. Location is just south of Iowa Park and about 2 miles north of nearest production.

Engle Petroleum Co. 1 Carminati, semi-wildcat northwest of the 1 Fenoglio, discovery well, drilled sand with oil shows from 5,844-95 ft. and tight sand from 6,054-71 ft. A 2-hour drill-stem test from 6,047-71 ft. recovered 90 ft. of free oil, and 30 ft. of oil and gas-cut mud with no water. It was drilling ahead.

Twelve miles south of Baird in Callahan County, Sun Oil Co. 1 Hill was drilling ahead at 3,642 ft. after a core from 3,618 ft. recovered 8 ft. of shaly lime and 2 ft. of hard lime with light oil show.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Callahan County: Clark & Cowden Oil Co. 1 J. W. Gray, Sec. 46, BBB&C Sur., 3½ mi. SW Clyde, TD 1,810 ft., pay 1,798 ft., flowed 117 bbl. 40°-gravity oil, 23/64-in. choke, TP 35 psi., GOR 300 cu. ft.
Trumpter Petroleum Corp. 1 Fred Hart, Sec. 7, D&DAL Sur., 6 mi. NW Putnam, TD 2,223 ft., pay 1,933-47 ft., pumped 13 bbl. oil.
Coleman County: Arthur Silberman 1 S. H. Stevens, Sec. 3, T&NO, 1½ mi. SE Glen Cove, TD 3,601 ft., Jennings sand 3,442-52 ft., 4,000,000 cu. ft. gas.
Jack County: Needl & Hood Drilling Co. 2



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Baylor County: Frank Wood 1 W. H. Portwood, W. R. Dickerson Sur., Blk. 184, dry, TD 4,570 ft.

Brown County: Gomac Oil Co. 1 Joe Weedon, J. B. Foreman Sur. 61, dry, TD 1,732 ft.

Callahan County: Miami Operating Co. 1 Troy Gifford, 1-D-SPRR, dry, TD 2,165 ft.

Lester L. Rice 1 S. O. Montgomery, T. Wheeler Sur. 213, dry, TD 1,175 ft.

Clay County: L. T. Burns 1 W. L. Wright, J. N. Sequin Sur., dry, TD 4,352 ft.

Coleman County: Clark & Cowden Oil Co. 2 Weaver Estate, 1-480-L. Johnson Sur., dry, TD 1,901 ft., Adams Branch 1,210 ft.

United North & South Development Co. 1-C Browning, Sec. 14, H. N. Smith Sur., dry, TD 3,700 ft., elev. 2,110 ft., Jennings 3,460 ft.

Eastland County: B. G. Byars 1 J. W. Carter, 16-4-H&TC, dry, TD 3,904 ft., elev. 1,600 ft., reef 3,830 ft.

Fisher County: I. B. Winberly 1 T. F. Holman, S. J. Swenson Sur. ,dry, TD 5,467 ft., elev. 1,765 ft., Flippen 3,080 ft., Strawn 5,420 ft.

Jack County: Joe K. Bailey 1 B. A. Smith, EPIW Sur., A-949, dry, TD 3,278 ft.

O. P. Leonard 1 E. A. Hill, BBB&C Sur., dry, TD 4,418 ft. in conglomerate.

Jones County: Gulf Plains Corp. 1 W. C. Leavitt, Sec. 23, D&DAL Sur., dry, TD 5,264 ft., elev. 1,556 ft., Strawn 3,820 ft., Caddo 4,780 ft., Mississippian 5,030 ft., Ellenburger 5,220 ft.

Jack C. Staley 1 Mrs. M. M. Minter, 13-15-T&P, dry, TD 2,609 ft.

Shackelford County: Hedrick Oil Co. 6 Chloe A. Nail, Sec. 120, ETRR, dry, TD 1,420 ft.

Stephens County: M. S. Ingleright 1 H. E. Langford, 52-6-T&P, dry, TD 2,265 ft.

P. W. Pitzer 1 P. W. Pitzer, 15-4-T&P, dry, TD 2,081 ft.

Stonewall County: C. L. Norsworthy, Jr. 1 Craft, 12-F-H&TC, dry, TD 6,698 ft., elev. 1,724 ft., Caddo 5,895 ft., Bend 6,206 ft., Mississippian 6,222 ft.

Young County: Feland & Gainer 2 H. L. Whitehead, TE&L Sur., A-413, dry, TD 1,585 ft.

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Appalachian-Ohio

Hope Natural Gas Co. Brings in Discovery

PITTSBURGH.—In Union district, Preston County, West Virginia, Hope Natural Gas Co. 9638 Margaret C. Kraus, elevation 2,128 ft., resulted in 8,500,000 cu. ft. of gas. Topping the Onondaga at 4,949 ft. and chert at 4,987 ft., the wildcat found production at the interval from 5,020-55 ft. Total depth was 5,058 ft.

In Beaver Pond district, Mercer County, United Fuel Gas Co. 6748 A. W. Hicks, elevation 2,834 ft., recorded the Corniferous lime at 8,012 ft., and is drilling below 8,025 ft. Deep Rock Oil Corp. is drilling at 3,171 ft. at 1 Bertha H. Thornbury et al, Williamsburg district, Greenbriar County.

Maryland.—A wildcat failure was reported for Garrett County. Richard Downing 1 McClain, elevation 2,505 ft., was drilled to 3,985 ft., with the following markers: Tully 3,160 ft., Onondaga 3,706 ft., chert 3,733 ft., Oriskany sand 3,852 ft.

Cumberland & Allegheny Gas Co. is running casing at 3,477 ft. in 1 H. M. Weeks. Columbian Carbon Co. 1 Artie E. Dodge, elevation 2,470 ft., recorded chert at 4,188 ft. and drilling at that depth.

Southwest Pennsylvania.—In South Buffalo Township, Armstrong County, Pittsburgh Plate Glass Co. 2-839 Mary A. McGinley, elevation 1,153 ft., is drilling at 6,745 ft. In Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-4003 A. J. Dotterway, elevation 2,094 ft., is drilling at 1,034 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Preston County, Union district: Hope Natural Gas 9638 Kraus, 8,500,000 cu. ft. gas from 5,020-55 ft., TD 5,058 ft.

MARYLAND WILDCAT FAILURE

Garrett County: Downing 1 McClain, dry, TD 3,985 ft.

OHIO

COLUMBUS.—Pure Oil Co. has completed a good well on an outside location at 5 Charles Richards, Third Quarter, New Castle Township, Coshocton County. The Clinton was reported as being 60 ft. thick with an estimated 60 bbl. natural that flowed 138 bbl. in 20 hours after shot.

Mossholder Drilling Co. extended oil production in southeastern Butler Township, Knox County, ¼ mile north with 6 C. F. Beatty, Section 21. Clinton sand at 3,033-81 ft. had a fair showing of oil natural that increased to 64 bbl. in 24 hours after shot.

A south extension to the small oil pool recently discovered in Section 9, Perry Township, Ashland County, was completed by Everett Waltz Co. in 1 Gerald Hiller. Berea sand at 708-38 ft. made an estimated 20 bbl. after shot.

Mutual O. and G. has moved in on a rank wildcat on John Scarpellini, in Lot 16, Cass Township, Muskingum County. The test will go to the Medina, unless production is found before it is reached.

Ohio Fuel Gas Co. has stepped out ½ mile to the south for a test on A. E. Tewksbury, in Section 10, Royalton Township, Cuyahoga County.

OHIO WILDCAT FAILURES

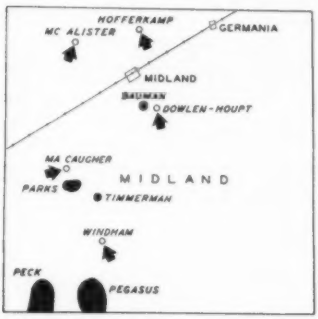
Richland County, Worthington Township: Fierbaugh & Ringler 1 H. E. Harris, Section 30, Clinton 2,551-53 ft., TD 2,681 ft.

Tuscarawas County, Jefferson Township: Stone Creek Brick Co. 1 S. L. Lorenz, Sec. 18, Clinton 4,644-65 ft., TD 4,699 ft.

Permian Basin

Pennsylvanian Discoveries Raise West Texas Reserves

MIDLAND.—Rapid development of Spraberry fields has overshadowed Midland County's new oil that has recently been discovered in Pennsylvanian and deeper rocks. These new deep fields, while small in an areal comparison with the Spraberry sand blanket, add considerably to the reserve picture. This week a number of the



deep discoveries and extensions were nearing the final stage with prospects of successful completion.

Northwest of Midland, Blackwood & Nichols' 1 Hofferkamp was moving off rig after acidizing in the lower Pennsylvanian between 11,128-70 ft. Last reported gage was 2 bbl. of oil an hour plus 1,000,000 cu. ft. of gas daily. Choke size, if any, was not disclosed. Shut-in pressure reached 3,870 psi. in 20 hours.

The 1 Hofferkamp was believed to be in the same pay zone as Moore Exploration Co. 11 Bauman, a Pennsylvanian discovery completed in June this year for 226 bbl. of oil a day from pay at 11,284-93 ft.

Moore Exploration 1 Dowlen - Houpt, southast of Midland, was drilling ahead at 12,065 ft., apparently going to the Ellenburger. Last top was called at 11,842 ft. on the Devonian, which was minus 9,062 ft.

A drill-stem test from 11,843-68 ft., open 2 hours and 10 minutes, had gas at the surface in 15 minutes, sprayed oil and water in 90 minutes, and recovered 100 ft. of 47°-gravity oil, 100 ft. of oil-cut mud, and some salt water on the bottom.

American Viking Corp. 1 McCaughey, extension test in the Parks area, had total depth at 10,600 ft. and pipe set 1 ft. off bottom for further tests. A test at 10,268-83 ft., near the top of the Pennsylvanian, recovered 1,000 ft. of clean, high-gravity oil, plus 250 ft. of heavily oil and gas-cut mud. At 10,468-10,559 ft., 3-hour recovery was 960 ft. of heavily oil and gas-cut mud.

North of Pegasus, Gulf Oil Corp. 1 John Windham was last reported drilling at 13,013 ft. A drill-stem test at 10,158-10,202 ft. recovered clean oil and mud-cut oil; at 10,368-98 ft. recovery was slightly gas-cut mud; and from 12,684-12,775 ft. recovery was drilling mud with no shows.

Greenbrier Oil Corp. 1 McAllister, southeast of Germania, was a probable Pennsylvanian discovery. At last report, a drill-stem test from 10,335-73 ft. had gas in 14 minutes and recovered 300 ft. of clean, 40°-gravity oil. A 2-hour test from 10,369-10,442 ft. developed 135 ft. of slightly gas-cut mud. Both tests were identified as in the Strawn lime. It was projected to 12,000 ft. as a Devonian exploration.

In Dawson County, Gulf Oil Corp. 1-Y Dean recovered a 9-ft. core between 10,802-18 ft. which was limestone with oil staining and porosity.

Superior Oil Co. has staked location for a 15,000-ft. wildcat 10 miles northeast of Andrews in Andrews County. The test is the 1-4A University in 3-4-University Lands Survey.

In Reagan County, J. H. Williams 1 J. D. Merchant, 4 miles southeast of Snowden 1 Gidney, was reported flowing oil through casing, as operators attempted to set a bridge plug around 6,555 ft. The oil was believed coming from the upper Spraberry, which was to be tested as soon as the flow was killed.

Ish McKnight and others 1 L. R. Wavle, 8 miles north of Best in Reagan County, cored sandy shale with fractures bleeding oil from 6,243-78 ft. Drill-stem tests of the interval were delayed due to mechanical troubles.

A new Gardner sand discovery 9 miles northeast of Ballinger in Runnels County has been completed flowing 114 bbl. of 41°-gravity oil a day. The new well is Miami Operating Co., Inc. 1 Joe Ashton. Potential gage was through 5/16-in. choke on perforations at 3,787-90 and 3,792-94 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Midland County: The Texas Co. 3-D Clarence Scharbauer, 18-39-2S-T&P, TD 10,722 ft., Strawn 10,330 ft., Bend 10,660 ft., pay 10,685 ft., perf. 10,658-708 ft., flowed 384 bbl. 43°-gravity oil, 18/64-in. choke, TP 1,400-825 psi., GOR 1,715 cu. ft.

Reagan County: Atlantic Refining Co. 1-B Sugg, 135-2-T&P, TD 5,550 ft., elev. 2,645 ft., Clear Fork 5,495 ft., flowed 405 bbl. 44°-gravity oil, ½-in. choke, TP 650 psi., GOR 90 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Martin County: Deep Rock Oil Corp. 1 Woodward, 24-3N-T&P, TD 9,287 ft., elev. 2,841 ft., Spraberry 7,639 ft., Dean 8,996 ft.

Runnels County: G. W. Strake 1-B White, Blk. 509, Wharton CSL, dry, TD 4,414 ft., Morris sand 3,666 ft.

Richard King, Jr. 1 Alcorn, Sec. 133, ET-&RR Sur., dry, TD 3,715 ft., elev. 1,834 ft., Fry 3,434 ft., Gardner 3,590 ft.

Scurry County: American Republics Corp. 1 Allen Simmons, 99-2-H&TC, dry, TD 7,284 ft., elev. 2,201 ft., Strawn 6,505 ft., Mississippian 7,050 ft., Ellenburger 7,216 ft.

Sterling County: Chapman & McFarlin 1 Sarah Bade, 16-22-H&TC, dry, TD 5,225 ft., elev. 2,461 ft., Clear Fork 2,460 ft., Wolfcamp 4,850 ft.

SOUTHEAST NEW MEXICO

HOBBS.—Paul L. Davis 1 Ralph Nix, 32-7s-38e, southeast Roosevelt County wildcat, was running electric surveys after drill-stem testing the San Andres from 4,760-4,800 ft. Recovery was 240 ft. of slightly oil and gas-cut mud in 1 hour and 45 minutes. Top of the section, by samples, was 3,915 ft.

Continental Oil Co. has completed its 1-S Hawk B-3 as a Hare field extension in 3-21s-27e, Lea County. Completion was through perforations in the McKee from 7,522-7,676 ft., and completion potential was 150 bbl. of 43°-gravity oil in 6 hours through 32/64-in. choke.

Stanolind Oil & Gas Co. 2 Louis Wingerd, extension try to the Gladiola field, was drilling ahead at 10,204 ft. in shale, lime, and chert. Gas-cut mud was recovered on a test at 10,011-70 ft.

Midway between the Gladiola and Denton fields, Forest Oil Corp. 1 H. L. Lowe had water in the Devonian and was to plug back to complete in the Wolfcamp. Drill-stem test at 13,088-13,145 ft. recovered water blanket and sulfur water.

Aurora Gasoline Co. 1 Davis, 29-18s-39e, extension well or discovery, which flowed out of control for 4 days at an estimated rate of 80 bbl. an hour, had the flow killed and pipe run to 4,449 ft. Operators were to drill ahead to the Clear Fork.

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Elliott, southeast of the Saunders field in 1-16s-34e, was drilling ahead at 10,921 ft. after drill-stem testing at 10,725-10,847 ft. Recovery in 90 minutes was 165 ft. of slightly gas-cut mud with no oil shows.

Magnolia Petroleum Co. 1 Black, wildcat in 9-15s-36e, recovered water cushion and 30 ft. of mud with no shows on a 1-hour test at 11,224-51 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Chaves County: DeKalb-Lyman 1 A. E. Elliott, 21-10s-26e, dry, TD 1,000 ft., San Andres 980 ft.

DeKalb and Magnolia Petroleum Co. 1 J. P. White, 31-9s-28e, dry, TD 7,463 ft., elev. 3,888 ft., Permo-Pennsylvanian 5,905 ft., Mississippian 6,805 ft., Devonian 6,990 ft., Ellenburger 7,290 ft., Cambrian 7,448 ft.

Eddy County: John E. Ritsema 1 Johnson, 30-17s-25e, dry, TD 1,204 ft.

TEXAS PANHANDLE (DISTRICT 10)

Randall County: Placid Oil Co. 1 Greeley, 54-1-TTRR, 10 mi. NW Canyon, dry, TD 8,244 ft., Tubbs 3,545 ft., Abo 4,185 ft., Pennsylvanian dolomite 4,950 ft., Cisco 5,495 ft., granite wash 6,610 ft., pre-Cambrian 8,202 ft.

California

Kern County Gets New Phacoides Sand Discovery

LOS ANGELES.—A new Phacoides sand discovery in western Kern County, located about 1 mile west of the northwest end of the old McKittrick field, is in the process of being completed. About 2½ miles southeast of this discovery, a second wildcat indicated it would give the Belgian anticline field a new zone and ½-mile northwest extension.

The potential field opener was E. A. Bender et al 1 Anderson in SE NE Section 15-30s-21e. On a 30-minute formation test of 14 ft. of oil sand at 4,602-30 ft., the wildcat flowed 33°-gravity crude at an estimated rate of 1,000 bbl. daily.

At the time of the test hole was bottomed at 5,000 ft. with 7-in. casing set at 4,607 ft. The operator planned to take one more core and then run 5¼-in. liner. Upon completion, Bender will skid the rig to the southwestern offset for 2 Anderson, which will test not only the Phacoides sand but also the deeper Oceanic and Point of Rocks zones.

These two deeper pays were found present in Ohio Oil Co. 1 Tulare fee in Section 19-30s-22e, 2½ miles to the southeast. About a month ago on a drill-stem test at 6,044-56 ft. the wildcat made a flow of 34°-gravity crude at a rate of 300 to 500 bbl. daily. Carried deeper to test the Point of Rocks pay, a formation test was made of this zone last week. On this test, at 6,509-98 ft., 54°-gravity condensate was produced at the rate of about 6 bbl. per hour along with 4 to 4½ million cubic feet of gas. Following the test the operator continued to core ahead.

Standard Oil Co. of California has suspended operations at its 2 Mushrush in Wasco field, which for a while indicated it would set a new United States producing-depth record. Originally completed as a large producer in 1939, hole had been carried to a new depth of 15,550 ft. from the original depth of 13,125 ft. Drilled 200 ft. into the Eocene, topped at 15,350 ft., the well showed promise of making a small producer in that zone last January.

In San Ardo field of Monterey County, The Texas Co. staked 11 new field wells on the northwest flank of the Campbell area and announced a new wildcat 5 miles to the northwest. The latter will be its 1 Alice Garrissere-Two, located in SE NW Section 24-22s-9e.

Another wildcat getting under way was E. A. Bender 1 Glenn on the east flank of the Ciervo anticline in Fresno County. To be drilled to 7,000 ft., the wildcat will be carried into the Cretaceous to test the Joaquin Ridge sand. Location of the test is in SW SW Section 22-16s-13e.

About 1 mile north of Strand production in Kern County, The Texas Co. has staked location for a new wildcat. It will be the 1 K.C.L.-Strand, located in NE NE Section 1-30s-25e.

CALIFORNIA SUCCESSFUL WILDCAT

Orange County, new zone discovery in Huntington Beach field: C. S. Black 1 Black Oil, 2-6s-11w, old well drilled deeper, TP pumped 56 bbl. daily, perf. 3,557-3,922 ft., 28 per cent cut, TD 5,400 ft., elev. 46 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Edison area: Standard Oil Co. 32 Voorhees Comm., 20-30s-29e, dry, TD 4,619 ft., elev. 450 ft.

Salt Creek area: Ferguson & Bosworth 3 Anderson, 19-29s-21e, dry, TD 702 ft., elev. 1,310 ft.

Tejon Hills area: R. B. Jackson 6 "Well," 11-11n-18w, dry, TD 640 ft.

Kings County, Hanford area: Oilfield Equipment & Supply Co. 1-5 Drummond-Union, 36-18s-22e, dry, TD 5,375 ft., elev. 245 ft.

Los Angeles County, Weldon Canyon area: Apex Petroleum Corp. 1 Weldon, 24-3n-16w, dry, TD 4,500 ft., elev. 2,025 ft.

Orange County, Brea-Olinda area: R. B. Watkins 1 Coyote Hills, 4-3s-9w, dry, TD 934 ft., elev. 1,196 ft.

San Benito County, Ciervo anticline area: Tillman B. Hess 1 Syndicate, 31-16s-11e, dry, TD 311 ft., elev. 1,900 ft.

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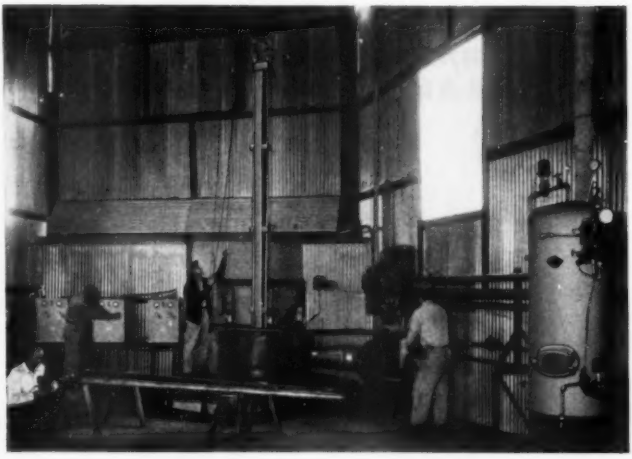

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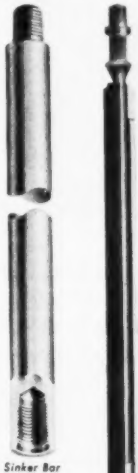

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Limestone County Wildcat Finds Pettit Limestone Dry

DALLAS.—Byrd-Frost, Inc. 1 A. P. Maddox, Limestone County wildcat, found the Pettit limestone dry in drill-stem testing at 5,480-5,525 ft. and was drilling ahead to the Travis Peak. Recovery was mud with no shows. Top of the Pettit was 5,460 ft. The well previously flowed 4,000,000 cu. ft. of gas a day, plus some distillate from the upper Rodessa at 5,055-60 ft.

In Anderson County, H. B. Pyle 1 Lula Henderson, northwest of Palestine, found water in the Woodbine sand which was topped at 5,220 ft. and was dry at 5,638 ft.

In Harrison County, Zephyr Oil Co. 1 Bouge, Wallace Survey, was shut in after perforating at 6,140-65 ft. A gas line was being laid to the well to run potential.

Grelling & Ellison 1 McGaughy, J. H. Evitts Survey, southeast of Ore City, cored 7,700-7,837 ft. in top of the Pettit with no shows and was drilling ahead at 7,905 ft.

In Grayson County, L. O. McMillan 1-A Price, G. L. Scott Survey, was drilling shale at 6,600 ft.

Pure Oil Co. had drilling under way at its 1 Earl Selz, wildcat 3 miles east of Tioga in the William Richard Survey.

Iowa-Payne Oil Co. 1 W. A. Byers, outpost test to the Deupree field of Wood County, logged oil shows in sub-Clarksville sand from 4,983-91 ft. and was to run casing and test.

Byars & Peveto 1 D. S. Lively, wildcat 5 miles northwest of Elkhart gas field, Anderson County, was drilling below 4,400 ft. on a 5,600-ft. contract. It is a Woodbine exploration.

R. J. Caraway 1 Jenkins-Shipp, Rains County Smackover wildcat, was drilling shale at 4,218 ft. Elevation on the 12,500-ft. operation is 492 ft., derrick floor.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Harrison County: Arkansas Fuel Oil Co. 1 Henrietta Riley, D. C. Moore Sur., 3 mi. SE Scottsville, TD 6,700 ft., perf. 6,575-6,651 ft., 8,500,000 cu. ft. gas.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Falls County: Shallow Rock Oil Co. 1 R. C. Avery, P. Zarza Sur., dry, TD 1,000 ft.

Gregg County: Warren Oil Corp. 1 Henderson Unit, David Hill Sur., dry, TD 7,500 ft., Paluxy 4,725 ft., upper Glen Rose 5,085 ft.

Navarro County: McCright & Guthrie 1 J. L. Turner, H. Fullerton Sur., dry, TD 2,018 ft.

Mineral Survey Co. 1 Nell Green, Thomas Ross Sur., dry, TD 802 ft.

Van Zandt County: H. D. McDonald 1 Irvin Burnett, G. H. Knust Sur., dry, TD 5,915 ft., Eagleford 3,363 ft.

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South Louisiana

Avoyelles Parish Wildcat Running Production String

NEW ORLEANS.—W. A. Moncrief is running 5½-in. production string to total depth of 10,002 ft. in side-tracked hole at 1 Virgil Descant, 31-1n-4e, Avoyelles Parish wildcat. Top of the Wilcox was picked at 7,458 ft. by electric log. A drill-stem test was conducted at 9,963-10,062 ft., but recovery is not known. Just how much possible pay has been encountered in this well has not been released. The prospective discovery is approximately 6 miles west of Longbridge townsite on Pearl Lake prospect.

New pay has been established in Plumb Bob field, St. Martin Parish, at The California Co. 1 State Lease 1882-St. Martin Land Co., 27-8s-7e. From perforations at 10,472-88 ft., the well is credited with 166 bbl. of oil per day through 8/64-in. choke. Tubing pressure registered 1,075 psi. This well is located 4,300 ft. southeast of the nearest production.

In Beauregard Parish, The Texas Co. 1 Isabel Crawford Logan, 4-3s-10w, wildcat 3 miles north of Pujo, is swabbing after perforating at 11,735-11,850 ft. On three previous tests deeper in the hole, the well flowed only salt water.

Placid Oil Co. has staked location for a 10,000-ft. wildcat 3 miles northwest of Bardelonville in Avoyelles Parish. Venture is 1 H. M. Hanner, C NW NW 23-2n-5e, and is in an area which has seen extensive wildcatting by Hunt interests.

In Terrebonne Parish, Humble Oil & Refining Co. has set casing in its wildcat, 1 L. L. & E. "D," 32-19s-20e, and is currently drilling below 12,976 ft. Operator set 7-in. casing to 12,159 ft. The well is located in the Bayou Jean La Croix area of the parish.

In the Dulac area of the same parish, Union Producing and Texas Gulf Producing Co. C-1 La Terre Co. is fishing at 14,690 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Plaquemines Parish: New oil discovery—The Texas Co. A-1 State Lease-Blind Bay, Twp. 22s-21e, TD 10,142 ft., perf. 8,363-71 ft., IP: 97 bbl. oil per day, 5/64-in. choke, TP 1,400 psi., 36° gravity.

Bay Coquille area: New pay—The California Co. 6 Louisiana State Lease 1785, 20-19s-18e, TD 11,106 ft., perf. 9,548-56 ft., IP: 178 bbl. oil per day, 7/16-in. choke, TP 1,700 psi., 38.6° gravity.

St. Martin Parish: New pay at Plumb Bob —The California Co. 1 State Lease 1882-St. Martin Land Co., 27-8s-7e, TD 12,000

ft., perf. 10,588-96 ft., IP: 166 bbl. oil per day, 8/64-in. choke, 30.4° gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Assumption Parish: W. T. Burton 1 Thibodaux, 12-16s-13e, dry, TD 4,111 ft.

Iberia Parish: F. Julian Fohs Driller Group 1 Darby Estate, 10-12s-6e, dry, TD 11,-982 ft.

Vermilion Parish: Union Oil Co. of California 1 Mary McIlhenny, 2-17s-2e, dry, TD 12,000 ft.

Mississippi

Franklin County Discovery Flows 110 Bbl. From Wilcox

JACKSON. — Final completion has been made on Lion Oil Co. 1 Thomas, 3-4n-1e, Franklin County oil discovery. From perforations in the Wilcox at 6,381-87 ft., the well flowed 110 bbl. oil plus 20 per cent water daily. Gage was made through 10/64-in. choke. Tubing pressure was 325 psi., and gravity of the oil was 32°.

In the same county, approximately 4 miles north of Lion's discovery, Hunt Oil Co. is running casing at 1 U.S.A., 20-5n-2e. This wildcat is bottomed at 11,200 ft. No details have been released on this well; however rumors persist that good shows of oil were found in the Wilcox, and that pipe is being run only to sufficient depth to test these shows.

On the flank of Glazier salt dome, Perry County, Union Producing Co. 1 Hinton, 30-4n-9w, encountered salt water in the Upper Tuscaloosa at 7,306 ft., after coring a considerable section of broken shale and sand with shows of heavy black oil. A drill-stem test was conducted at 7,308-15 ft. with recovery being salt water with only a scum of heavy black oil. No salt water was encountered in the dome-discovery well down to 7,476 ft., where cap rock was encountered. Operators are now drilling ahead below 7,552 ft. in this confirmation test.

In northern Wayne County, Gulf Refining Co. 1 Chapman, Smackover wildcat in 19-10n-6w, is coring below 13,000 ft. Recovery from core at 13,536-39 ft. was 1 ft. of hard lime with black-oil stain in top 3 in. Electric log was then run to 13,542 ft., and another core cut at 13,545-95 ft. with recovery being hard grey lime with streaks of black shale and pink anhydrite. Next core was cut at 13,598-13,648 ft. with recovery being only 1 ft. which was salt. It is believed that faulty core catchers were the cause of the poor recovery. The section being cored is thought to be Buckner or Haynesville and is above the Smackover.

Alabama. — In Clarke County, Alabama, James L. Duffy 1 Scotch Lumber Co., 24-7n-4e, cored a slight show of oil in the Eutaw which was topped at 3,365 ft. Core was cut at 3,370-90 ft., with recovery being 1 ft. of sand with possible oil odor, 13 ft. of sandy shale with no show, and 6 ft. of salt-water sand. The possible show is thought to be hardly enough to establish commercial production. The wildcat will be drilled to approximately 5,300 ft.

MISSISSIPPI SUCCESSFUL WILDCATS

Adams County: Oil discovery "Cowpen Point"—Humble Oil & Refining Co. B-2 James S. Giles, et al, 4-7n-3w, TD 6,509 ft., Wilcox 5,287-91 ft., IP: 180 bbl. of oil per day, ⅛-in. choke, TP 700 psi., 45.6° gravity.

Frankline County: Oil discovery, "'Freeswood"—Lion Oil Co. 1 Thomas, 3-4n-1e, TD 7,218 ft., Wilcox 6,381-87 ft., IP: 110 bbl. oil per day, 10/64-in. choke, 32.0° gravity, TP 325 psi.

MISSISSIPPI WILDCAT FAILURE

Adams County: Gulf Refining Co. 2 L. A. Whittington "A," 34-7n-1w, dry, TD 6,540 ft.

Southwest Texas

Shell Wildcat Finds New Frio County Production

CORPUS CHRISTI. — One and one-half miles east of Big Foot field production in Frio County, Shell Oil Co. has completed 1 Dennis Thompson for 72 bbl. of oil daily on pump. Production is from open hole at 3,489-3,570 ft. This wildcat is located 7,000 ft. north-northwest of Goldston Oil Corp. 1 Anna G. Witting, new oil discovery for the area.

New pay is being established in Labbe field, Duval County, at Lewis Kelsey and W. H. Martin 1 Labbe Brothers, J. Poitevent Survey. On drill-stem test at 2,792-95 ft., using ¼-in. chokes, recovery was 60 ft. of pipe-line oil. Operators are installing pump for completion. The well has an estimated potential of 40-60 bbl. of oil daily.

C. G. Glasscock and Pontiac Refining Co. 1 State Tract 48, Copano Bay wildcat, Aransas County, topped a new oil sand at 6,188 ft. and at last report was coring at 6,989 ft. It is estimated that at least 80 ft. and possibly 100 ft. of effective oil sand has been cored in the well. This well is located across a big fault from other Copano Bay production. It is 6 miles northwest of Rockport.

The Chicago Corp. B-2 Bessie Cocke, Starr County wildcat south of Marks field, has tested oil in a new shallow pay for the area. On drill-stem test at 2,319-25 ft., recovery was 180 ft. of 31.7°-gravity oil and

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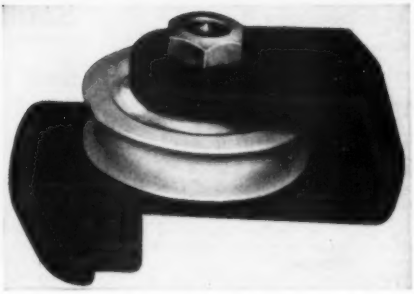

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30 ft. of oil-cut mud. Bottom-hole flowing pressure was 345 psi.

Magnolia Petroleum Co. 1 Grace Doughty, Hidalgo County wildcat, at last report was drilling at 14,351 ft. on a proposed 15,000-ft. contract. No tests have been run in this deep venture, which has 7-in. protective pipe set at 12,590 ft.

Meanwhile, in the extreme southeast tip of Cameron County, C. G. Glasscock 1 Mellie Esperson Estate, wildcat, was drilling at 11,700 ft. on a deepening project. This test has 7-in. protective casing set at 11,429 ft. Drilling was halted in June of this year, and operator has gone back in the hole to deepen to 14,000 or 15,000 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: F. William Carr & Louis Haring, Jr., 1 Victor W. Marsh, M. A. Hall Sur. 76, A-1,217, dry, TD 4,612 ft.

J. D. Hancock 1 G. W. Foster, et al, J. S. Joline Sur. 523, A-500, dry, TD 1,927 ft.

Bell County: R. W. Krause 1 R. G. Yates, A. G. Moore Sur., Block 402, dry, TD 1,098 ft.

Jim Hogg County: Southern Minerals Corp. 1 San Antonio Loan & Trust Co., Diego Hinojosa Grant, A-357, dry, TD 4,416 ft.

Medina County: G. W. McCarter 1 H. E. Mofield, J. F. Torrey Sur. 112, dry, TD 1,475 ft.

Starr County: Dulaney Oil Co. 1 Mary S. Thomas, Porcion 103, 2 mi. SW of El Sauz, dry, TD 1,635 ft.

Webb County: Killam & Hurd, et al, 1 Perez, Sur. 459, 7½ mi. N of Bruni, dry, TD 2,872 ft.

Panhandle Producing & Refining Co. 2 Puig, Las Albercas Grant, dry, TD 3,332 ft.

Wilson County: O. W. Killam 1 Rapstine, A. Hernandez Sur., A-17, dry, TD 5,700 ft.

Texas Gulf Coast

Colorado County Well Gets Wilcox Stringer Production

HOUSTON. — Production is being established from the first stringer sand of upper Wilcox in Hamil field, Colorado County, at Rex Cauble 1 J. F. Walker. The well flowed an estimated 60 bbl. of 38°-gravity oil daily from perforations at 6,670-80 ft. Flowing pressure was 100 psi., and it is believed that the well will be put on pump for final completion. Pay sand is 10 ft. thick and was acidized with 750 gal. of mud acid before the well would flow. Although the stringer sand opened by Cauble is found in most of the wells in this 6-year old field, this is the first successful production to be obtained.

Approximately 3 miles north of Arnim field, Fayette County, Sohio Petroleum Co. 1 Brown, J. Stiffler Survey, Abstract 287, is being completed on pump. This Buda lime discovery well pumped 60 bbl. of oil in 5 hours from 7,837-62 ft.

In Tyler County, C. N. Housh-Humble Oil & Refining Co. 1 Read, et al, has been completed for 13,000,000 cu. ft. of gas daily from the Wilcox at 9,804-14 ft. Hole is bottomed at 9,904 ft. with 5½-in. casing cemented at that depth. This discovery is in BBB&C Survey, Abstract 109, approximately 5 miles east of Hillister.

Testing continues at Anderson-Prichard Oil Corp. 1 Miles Knolle, Austin County wildcat approximately 7½ miles northwest of Bellville. This is the third attempt to get a test. Previous unsuccessful tests were conducted at 9,696-98 ft. and 9,750-52 ft. Operators are now attempting to test perforations again at 7,750-52 ft.

Cecil Hagen 2 J. H. Tigner, Brazoria County wildcat, is at total depth of 5,222 ft. and has been correlated with 1 Tigner by log. Indications are that the well is running 155 ft. higher, and analysis of cores already taken indicate that the well will be a producer from the upper Frio. However, the well will be drilled ahead to 5,650

ft., logged again, and remainder of Frio cored. Operator's 1 Tigner was saturated in the lower Frio.

American Republics Corp. and Houston Oil Co. of Texas have staked location for a confirmation test to the new Vickers field in Hardin County. Test is 2 John A. Vickers fee, located 2,486 ft. east and slightly north of the same operator's discovery well, 1 Vickers. Contract depth is 8,850 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Colorado County: New pay at Frelsburg—Sinclair Oil & Gas Co. 1 H. R. Cullen, Casper Simon Sur., A-502, TD 10,425 ft., Cullen 9,672-80 ft., IP: 366 bbl. oil per day, 43.2° gravity, TP 1,000 psi.

DeWitt County: Gas discovery—Sunray Oil Corp. 1 Gus F. Baacke, Enoch Jones Sur., A-281, TD 7,850 ft., Slick-Wx. 7,577-86 ft., IP: 4,400,000 cu. ft. of gas per day, open flow, SIP 1,900 psi.

Tyler County: Gas discovery—C. N. Roush-Humble Oil & Refining Co. 1 Read, et al, BBB&C Sur., A-109, TD 9,904 ft., Wilcox 9,804-14 ft., IP: 13,500,000 cu. ft. of gas daily, SIP 3,340 psi.

TEXAS GULF COAST (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bee County: J. G. Gallaher Drilling Co. 1 G. W. Frels, John Ryan Sur., A-63, dry, TD 4,022 ft.

Harris County: F. M. Blair, Jr., 1 Blanche Kennedy, et al, David Harris League, 6 mi. SE of Humble, dry, TD 9,017 ft.

Lee County: Kirkwood & Co. and Alex W. Head 1 Herbert Mittasch, J. D. Warreleman League, Block 33, dry, TD 8,570 ft.

Refugio County: Holly Development Co. 2 J. A. Hynes, John Malone Sur., A-46, dry, TD 7,216 ft.

Phillips Petroleum Co. 1 F. O. Rooke, J. M. Aldrete Sur., 8 mi. SW of Woodsboro, dry, TD 9,003 ft.

Wharton County: Sinclair Oil & Gas Co. 1 Maxine Means., Thos. Slaughter Sur., A-59, dry, TD 8,728 ft.

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Rocky Mountain

Amerada Testing Important Second Beaver Lodge Well

DENVER.—Oil men of the Rocky Mountains are closely watching successive tests by Amerada Petroleum Corp. at 1 Dilland, C SW NE 31-156n-95w, second well in the Beaver Lodge area, Williams County, North Dakota.

This well first made oil from the Madison (?) on test 8,396-8,444 ft., where the well flowed a total of 215 bbl. of oil in 4 hours. A test 8,469-99 ft., open 5 hours 50 minutes, had gas to the surface in 16 minutes with oil at the surface in 2 hours 45 minutes. In the first hour the well flowed 28.36 bbl., the second hour 8.16 bbl., and the third hour 21.76 bbl. with flowing pressure 1,000-1,250 psi.

On test 8,499-8,529 ft. the well again flowed 57 bbl. of oil per hour with a gas flow of 8,518 cu. ft. per hour. On test 8,529-59 ft. there was a light blow with a recovery of 100 ft. of slightly gas-cut mud. The well is now at 8,620 ft., total depth, with the operator preparing to test.

Amerada's 1 Binhomer Risser, C SW SE 12-149n-98w, wildcat in the Croff area, 40 miles south of the Beaver Lodge area, showed 478 ft. of very slightly gas-cut mud on 1-hour test of the zone 8,449-8,515 ft. This well is believed above the zone productive at the second Beaver Lodge well.

Across the state line in Montana Shell Oil Co. is coring below 9,165 ft. at 1 Pine Unit, SW SW NE 30-12n-57e, Wibaux County. This well found oil on drill-stem test of the zone 8,924-75 ft., possibly in lower Devonian or Ordovician. Additional shows were reported encountered. This well and Shell's Richey area well in northern Dawson County, now below 10,187 ft., are of considerable importance to the Williston basin exploratory-drilling play.

The Texas Co. is reported coring below 8,680 ft. after recovering some staining in the upper Devonian at 1 Northern Pacific "B," C NE NE 35-15n-34e, on Baker Glendive, Dawson County, between the two Shell wildcats.

Shell Oil Co. recovered 1,000,000 cu. ft. of gas daily on test of the top of Muddy sand at the Goodrich area wildcat, 1 Williams, NW NW SE 30-5n-90w, Morgan County, Colorado, with oil recovered on test of the zone immediately below the gas. The gas was found between 6,443-66 ft. and the oil at 6,512-30 ft. In 75 minutes the recovery of oil was 100 ft. with 180 ft. of heavily oil and gas-cut mud. Shell is coring below 6,666 ft. on the wildcat and heading for the Dakota sand. This well is south of Greasewood field and west of the majority of discoveries in the current exploratory play through this basin.

In Wyoming there is considerable interest in Sinclair Oil Co.'s wildcat at East Salt Creek. The well is now drilling below 5,580 ft. This wildcat is 1 East Salt Creek, SE SW SW 10-40n-78w, Natrona County, 5 miles east of closest production in Salt Creek field and 8 miles south of Meadow Creek field. The well topped Frontier at 4,533 ft. and, on test in that formation, made 450 ft. of 35°-gravity oil with 120 ft. of oil and gas-cut mud in 1 hour. The operator has not reported tests of the Second Frontier, but unconfirmed rumors are to the effect that the well flowed from that formation. The wildcat is of importance as another of the series along the southwest flank of the Powder River basin.

A total of 19 wildcats were completed in the area this week with no oil discoveries but three gas wells. Seven of the wells were in Wyoming with the Helmerich & Payne et al. East LaBarge deep test one of the most important. This well went to 10,972 ft., total depth, in Nugget sand. It is located southwest of the Tip Top discovery, which recently attracted considerable attention to the west side of the Green River basin.

In Colorado Roy Johnson et al. completed

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the Hells Hole discovery, along the Utah line, with the well good for 11,200,000 cu. ft. daily from Upper Cretaceous. C. D. Edmonson and Kansas-Nebraska Natural Gas completed a new gas discovery in the Big Spring area, Deuel County, Nebraska.

WYOMING WILDCAT FAILURES

Big Horn County, Paintrock area: E. L. Corwin 1 Government Tr. 85 Lot B 49n-90w, TD 1,736 ft., dry, Chugwater 1,280 ft., Fault 1,342 ft., Chugwater 1,342 ft., Dinwoody 1,410 ft., Phosphoria 1,500 ft.

Fremont County, West Dutton basin area: Amerada Petroleum Co. 1-A USA-Mullen, SW SW SE 31-33n-90w, TD 833 ft., dry, base Tertiary 180 ft., Frontier 280 ft.

Laramie County, Farthing area: Seaboard Oil Co. 1 Unit, SW SW SW 14-18n-69w, TD 4,665 ft., dry, Cretaceous 995 ft., Niobrara 3,190 ft., Timpas 3,605 ft., Muddy 4,350 ft., Lakota 4,630 ft., Morrison 4,645 ft.

Platte County, Spanish Diggings area: Niloco et al. 1 J. A. Payne, NE SE NE 7-30n-66w, TD 2,265 ft., dry, first Converse sand 1,190-1,225 ft., second Converse sand 1,375-1,407 ft., Red Marker 1,515 ft., first Leo 1,580 ft., second Leo (?) 1,780 ft., third Leo 1,840 ft., fourth Leo 1,890 ft., Bell sand 2,113 ft., Guernsey 2,215 ft.

Sublette County, East LaBarge area: Stanolind-Carter-Helmerich & Payne 1 Hutchinson C-234, C SE SE 33-27n-112w, TD 10,972 ft., dry, first Wall Creek 7,312 ft., second Wall Creek 7,904 ft., Dakota 8,997 ft., Nugget 10,934 ft.

Uinta County, Leroy area: Shell Oil Co. 3 Unit, NE NW NW 33-16n-117w, TD 4,450 ft., dry, Nugget 1,820 ft., Woodwide 3,054 ft., Dinwoody 3,650 ft., Weber 4,220 ft.

Weston County, Chalk Butte area: Texas Pacific Coal & Oil Co. 1-"A" Gov't., C SE NW 26-47n-67w, TD 8,780 ft., dry, first Wall Creek 5,332 ft., Greenhorn 5,522 ft., Muddy 6,500 ft., Dakota 6,735 ft., Lakota 6,820 ft., Morrison 6,890 ft., Sundance 6,990 ft., Spearfish 7,320 ft., Minnekahta 7,890 ft., Minnelusa 8,162 ft.

COLORADO WILDCAT SUCCESS

Rio Blanco County, Hells Hole area: Roy Johnson et al. 1 Gov't., C SE 12-2s-104w, TD 2,495 ft., IP flowed 11,200 M.c.f. gas per day. Mesaverde 1,142 ft.

COLORADA WILDCAT FAILURE

El Paso County, Crows Roost area: J. B. Stoddard 1 State, CE½ SE NE 20-15s-62w, TD 6,319 ft., dry, Niobrara 4,743 ft., Greenhorn 5,474 ft., Dakota 5,688 ft., Morrison 5,950 ft., Entrada 6,228 ft.

MONTANA WILDCAT SUCCESS

Liberty County, Bears Den area: Frazer-Anderson-Erickson 1 fee, C NW 4-36n-6e, TD 3,374 ft., IP 1,250,000 cu. ft. of gas, basal Ellis 3,237-45 ft., Madison 3,335 ft.

UTAH WILDCAT FAILURES

San Juan County, Montecello area: Byrd-Frost, Inc., 1 Randall, C SE NW 23-33s-24e, TD 6,265 ft., dry, Dakota 198 ft., Summerville 750 ft., Entrada 1,035 ft., Carmel 1,230 ft., Navajo 1,270 ft., Chinle 2,135 ft., Shinarump 2,665 ft., Moenkopi 2,745 ft., Cutler 2,860 ft., Rico 3,920 ft., Hermosa 4,465 ft., Paradox 5,659 ft.

Wasatch County, St. George area: The California Co. 1 Unit, SW SW NE 19-43s-15w, TD 6,347 ft., dry, upper Callville 3,730 ft., lower Callville 4,600 ft., Bluepoint 5,350 ft., Red Wall 5,560 ft., Devonian 6,119 ft.

WESTERN NEBRASKA WILDCAT SUCCESS

Deuel County, Big Springs area: C. D. Edmonson and Kansas-Nebraska Natural Gas Co. 1 "E" Trollstrup Livestock Co., E½ NW NE 3-12n-43w, TD 3,477 ft., IP flowed 20,000 M.c.f. gas per day. Niobrara 2,530 ft., Ft. Hays 2,820 ft., Carlile 2,872 ft., Greenhorn 3,028 ft., "D" sand 3,208 ft., "G" sand 3,263 ft., "J" sand 3,327 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Banner County, Northeast Harrisburg area: H & H Drilling Co. 1 Fred Grant, C NW NE 26-19n-55w, TD 5,744 ft., dry, Niobrara 4,742 ft., Ft. Hays 4,945 ft., Codell 5,048 ft., Carlile 5,074 ft., first sand 5,557 ft., Muddy 5,703 ft.

Chase County, wildcat: Suhr-Fiedler & Lock 1, NE SW NW 7-6n-41w, TD 4,035 ft., dry, Pierre 617 ft., Niobrara 2,120 ft., Ft. Hays 2,500 ft., Carlile 2,610 ft., Greenhorn 2,725 ft., Graneros 2,800 ft., "D" sand 2,915 ft., "J" sand 3,005 ft.

Cheyenne County, wildcat: S. D. Johnson 1 Bolie, SW SW NW 27-16n-50w, TD 4,799 ft., dry.

Morrill County, Angora area: C. G. Glasscock 1 Dove, SE SE SE 33-21n-50w, TD 4,500 ft., dry.

Sioux County, Southwest Harrison area: Continental Oil Co. 1 John H. Wear, NW NW NW 10-29n-57w, TD 7,665 ft., dry, Niobrara 3,605 ft., Greenhorn 4,145 ft., Graneros 4,270 ft., Muddy 4,695 ft., Dakota 4,909 ft., Lakota 4,990 ft., Morrison 5,110 ft., Sundance 5,090 ft., Chugwater 5,315 ft., Minnekahta 5,680 ft., Opeche 5,745 ft., Minnelusa 5,820 ft., Fairbanks 7,192 ft., Guernsy 7,310 ft., pre-Cambrian 7,456 ft.

NORTH DAKOTA WILDCAT FAILURE

Pierce County, wildcat: Ajax Oil Co. 1 Bell, C NE NE 28-158n-72w, TD 5,383 ft., dry, Niobrara 1,100 ft., Greenhorn 1,430 ft., Graneros 1,600 ft., Jurassic 2,135 ft., Gypsum Springs 2,565 ft., Madison 2,700 ft., Devonian 3,260 ft., Silurian 4,070 ft., Stonewall 4,105 ft., Ordovician 4,260 (?) ft.

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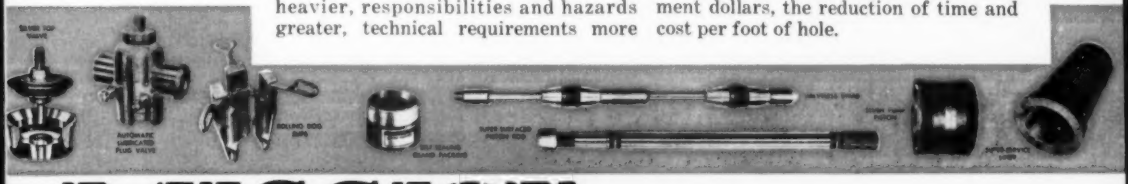

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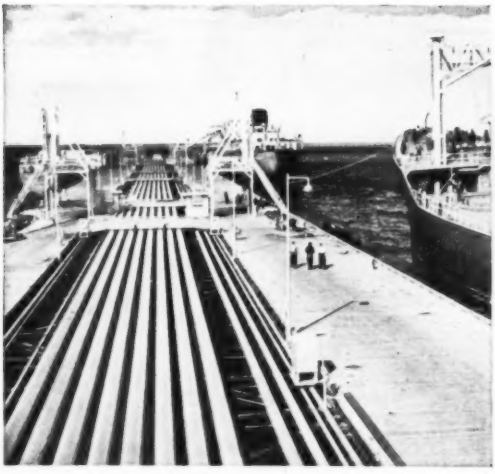

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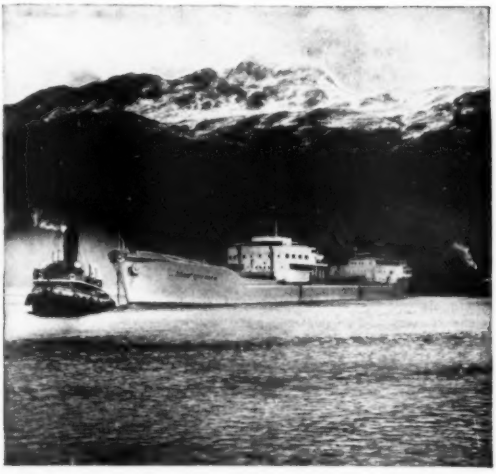

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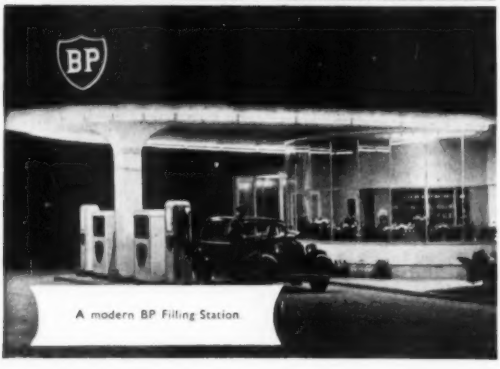

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Central Area

ILLINOIS

Dale Hopkins is opening a new Benoist (Bethel) sand pool 3 miles southeast of Nashville, Washington County, where his 1 Kruski, NE NE SE 33-2s-2w, swabbed at the rate of 2 bbl. of oil per hour natural in initial tests of that pay zone, logged and open at 1,430-38 ft. Since these tests, the pay has been shot with 17 qt. of nitro and hole now is being cleaned out for further tests.

Extension of this area a mile to the east already is indicated where the same operator's 1 Waldo Fink, SW NE NE 34-2s-2w, has casing run to test the same pay zone found at approximately the same depth, 1,430-39 ft. Total depth of the latter well is 1,442 ft. with casing at 1,426 ft. A 30-minute drill-stem test taking in an interval at 1,426-42 ft. recovered 1,000 ft. of oil with some water.

The area is 3 miles from nearest production in the Dubois district to the southeast.

Gulf Refining Co. 1 Oelze, NW NE SW 3-1s-5w, Silurian reef discovery well 14 miles northwest of Nashville in southwestern Clinton County, which adjoins Washington County on the north, swabbed at the rate of 70 bbl. of oil natural per day from casing perforations at 2,050-56 ft. Pay is being acidized in an attempt to improve production. This well logged 134 ft. of saturation in the Devonian - Silurian section. Total depth is 2,077 ft.

George Aubrey and associates 1 Brown, NW SW SW 11-5s-10e, 5 miles south of Crossville and 1½ miles southwest of production in the Phillipstown Consolidated pool, in White County, swabbed 36 bbl. of oil with 12 bbl. of water in initial tests of saturation found in Aux Vases sand at 2,981-91 ft.

Production in the Toliver area, Clay County, is being extended ½ mile to the northwest where Herman Graham 1 McGee, S½ SE NE 27-5n-6e, produced at the rate of 40 bbl. of oil per hour initially in swabbing tests of McClosky lime at 2,772-79 ft. The area is 5 miles north of Louisville.

INDIANA

Indiana Farm Bureau is opening a new Biehl sand pool at its 1 Phillips Community, SW NW SW 16-6s-11w, 2 miles west of Evansville, Vanderburgh County. Swabbing tests at a total depth of 1,523 ft. with hole open below 1,517 ft. produced at the rate of 1½ bbl. per hour. Hole was deepened to 1,529 ft. where the well swabbed 2 bbl. per hour. Since these tests, pay zone has been shot with 15 qt. and now is being cleaned out for further tests. The discovery, located a mile east of the Belknap pool, has been designated as Belknap East pool. The location is in a suburban area of small tracts where an active drilling program is in prospect.

EASTERN KENTUCKY

In Lawrence County on the northwest edge of production in Martha pool, Ashland Oil & Refining Co. at 37 William Lester had Stray sand at 896 ft., first Weir sand at 917 ft. and second Weir at 978 ft. Drilled to a total depth of 1,020 ft., the well was shot with 226 qt. of nitroglycerin, and operators are now cleaning out and testing.

In Pike County sector of Big Sandy gas field, Kentucky-West Virginia Gas Co. deepened 770 Robert Damron et al. from the Pennsylvanian Salt Sand formation to the Devonian black shale at 3,281 ft. total depth and completed for 260,000 cu. ft. gas daily. Old total depth was 1,461 ft.

MICHIGAN

A Traverse oil-water pay was under test this week at McClure Oil Co. 1 Johnson, NW SE NW 25-12n-14w, Sheridan Township wildcat, Newaygo County. Although wildcat showed for an average of 30 bbl. of oil a day natural on a 3-day swab-test, a heavy

(Continued on page 196)

Louisiana-Arkansas

Two Strikes Indicated In Dismal Swamp Area

SHREVEPORT.—In Dismal Swamp, Concordia Parish, Hunt Oil Co. and Gulf Refining Co. 2 L. D. Dale, C SE SW 42-4n-8e, flowed at the rate of 125 bbl. of oil daily. The wildcat was drilled to a total depth of 7,500 ft., and has 7-in. casing set at 6,662 ft., perforated from 6,552-56 ft. A 7-hour drill-stem test had gas at the surface in 20 minutes. Operators report that the well has about 10 ft. of oil sand underlain by water sand.

Three miles to the northeast, the same team's 1 L. D. Dale, another prospective discovery in C SE NW 29-4n-8e, is preparing for production tests. This well, also bottomed at 7,500 ft., has 7-in. string cemented at 7,041 ft. and perforated from 6,944-48 ft. A drill-stem test recovered 80 per cent salt water and 20 per cent oil. A good show was encountered in an oil sand logged at 6,945-51 ft.

In Bossier Parish, Hodges Industries, Inc. 1 Pardee et al, Cotton Valley outpost venture, cored good porosity and permeability at 9,487½-89½ ft. Spotted southwest of the center of 26-21n-11w, 1 mile west of "D" sand production in Cotton Valley field, the well previously assured production from the Davis said (Cotton Valley) at 8,858-68 ft. On a drill-stem test from 8,855-93 ft., the 1,500-ft. water cushion came to surface in 11 minutes and gas in 20; recovery was 11 stands of condensate and 2 stands of water cushion and mud. While no tests have been run on the last shows, the well showed a good kick while coring at 9,504 ft., mud weight cutting from 11½-8½ lb.

Arkansas.—Hunt Oil Co. has an apparent confirming extension of North Shongaloo field into the state at its 1 Haynes et al. unit, Section 11-20s-22w, Columbia County. The Pettit was perforated at 5,803-09 ft. and 5,323-29 ft. After acidizing with 2,400 gal., the well kicked off and flowed oil and acid water at the rate of 57 bbl. per hour on a 5-hour test. Casing is set at 5,861 ft., 10 ft. off bottom.

Two new developments are reported for the dry gas area of northwestern Arkansas in Franklin County's White Oak and Lone Elm fields. Arkansas Western Gas Co. has staked the 1 Muncy, Section 25-10n-27w, 3,500-ft. test in White Oak. The same operator is moving in tools at its 1 Lessley, Section 14-10n-28w, Lone Elm field. The company's 1 Davis, C W/2 NW 18-10n-26w, has indicated some 14,000,000 cu. ft. of gas per day in two sands at 2,700 ft. and 3,000 ft. All are cable-tool operations.

W. G. Skelly will drill a deep wildcat in the southeastern corner of Miller County. Proposed depth at the venture, 1 Dickson heirs, Section 36-19s-27w, has not been reported but it is believed to be planned as a Smackover lime test. It lies 8½ miles northeast of the Smackover discovery in Rodessa field, Arkla Oil Co. 5 Pitts. The 6 Pitts, less than ½ mile west of the discovery, was dry at 11,395 ft. last year.

NORTH LOUISIANA WILDCAT FAILURES

Claiborne Parish: T. L. James & Co. 1 Gray, C SE NW 20-22n-5w, dry, TD 5,203 ft.

Concordia Parish: Hunt Oil and Gulf Refining 6 Metropolitan Museum, 2,300 ft. S and 100 ft. W NEc 18-3n-7e, dry, TD 7,500 ft.

Campbell et al 1 Shireman-Dale, 900 ft. S and 1,150 ft. W NEc 30-6n-9e, dry, TD 7,008 ft.

ARKANSAS WILDCAT FAILURES

Columbia County: McAlester Fuel et al 1

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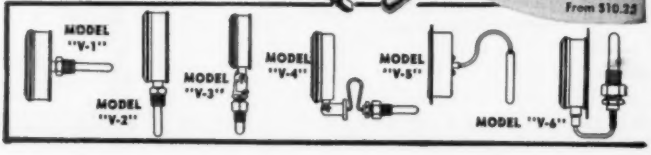


Gean "A," 731 ft. N and 1,901 ft. E SWc 6-17s-20w, dry, TD 7,801 ft.

Lafayette County: Montgomery 1 Moore est., 100 ft. N of C SE NW 2-16s-25w, dry, TD 4,400 ft.

Lincoln County: Lion Oil 1 Clinton, SE SE NW 10-10s-8w, dry, TD 4,204 ft.

Canadian Fields

Viking Sand Discovery Flows Gas in Saskatchewan

CALGARY.—Superior Oils group has discovered a flow of natural gas from the Viking sand at its exploratory driller in the Dodsland area of West Central Saskatchewan.

The gas discovery well, Superior 1 Dodsland, LSD 9, 16-32-21w3, is about 15 miles east-northeast of the Coleville well which discovered gas in the Viking plus heavy oil in the basal Cretaceous. A series of drill-stem tests were run at 2,200-57 ft. at the Dodsland well, but packer failed on all but one test. During that successful test a flow of natural gas reached the surface in 1 minute, and sustained at 442,000 cu. ft. daily for 10 minutes before packer again failed to hold. Crew is now continuing to drill ahead below 2,257 ft. Hole will be carried down as a D3 Devonian test.

The first follow-up venture to the Viking sand oil discovery in the Armena area contacted the oil pay zone 10 ft. higher than the discovery well, and during initial drill-stem test in that section flowed oil to the surface.

The second assured producer at Armena, Homestead-North Canadian 3, Armena, ¼ mile north of the discovery, found Viking pay top at 3,252 ft. A 61-minute drill-stem test at 3,247-57 ft. gave a flow of oil to the surface in 39 minutes, at estimated rate of 408 bbl. daily. There was no water recovery. The well continued down and found a total of 20 ft. of water-free oil pay and string of production casing has now been set.

Oil success is indicated at a venture in the South Leduc-Kavanagh area, about 1¼ miles distant from previous D2 oil producers in that area. The well, High Crest-Northern Development 1 South Leduc, LSD 4, 17-49-25w4, found gas and some oil during two D2 drill-stem tests run this week.

A 65-minute test at 5,194-5,234 ft. gave a natural gas flow rate of 277,000 cu. ft. daily and a recovery of 420 ft. of gassy oil. A 1-hour test at 5,234-54 ft. gave gas rate of 50,000 cu. ft. daily and recovery of 30 ft. of gassy, mud-cut oil.

Location has been staked for first follow-up to the "wet gas" discovery made in the Neapolis area of southern Alberta this past summer. That Devonian discovery was made at a site located some 35 miles north of Calgary, 13 miles east of Didsbury and 15 miles southeast of Olds. It was drilled by the A. G. Bailey Co. group, Anglo-Canadian Oil Co. and Calmont Oils, Ltd., on farmout lands from Hudson's Bay Oil & Gas Co., Ltd.

The new start is Hudson's Bay 2 Olds, LSD 4, 9-31-27w4, 1¾ miles southeast of Bailey 1 Olds, wet gas discovery.

The discovery well, Bailey 1 Olds, LSD 2, 18-31-27w4, is believed capable of putting out between 50 and 70 million cubic feet of gas and over 700 bbl. condensate daily. The condensate or light crude oil is rated as 58°-gravity. Sulfur content of the gas is around 12½ per cent. A 60-day test period at the discovery was completed prior to staking the first follow-up venture, but full details of those test results have not as yet been received.

Alberta's 177 drilling rigs are currently completing wells at a rate better than four per day, with an average of three of these four wells resulting in oil production. The past week accounted for another 30 completions in Alberta, including 22 oil wells, 2 gas wells, and 6 dry holes. During the 292-day period from January 1 to October 19 of this year wells completed at an average rate of more than three daily. That period has yielded 957 completed wells. Of that total 623 were oil producers, 78 were gas wells and 256 were dry holes.

CANADIAN WILDCAT FAILURES

Calmont-Anglo-Security 2 Barons, LSD 2, 26-11-23w4, TD 5,279 ft.

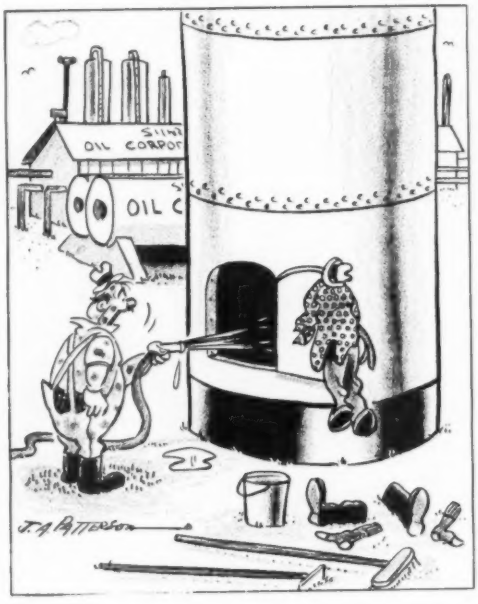
Hy-Flow 1 Spirit River, LSD 3, 10-78-8w6, TD 6,400 ft.

EASTERN CANADA

ONTARIO.—In the Rodney area, Elgin County, A. G. Bailey Co., of Calgary, drilling on the George Cipu farm, Lot 12, Concession 5, Aldborough Township, encountered light crude of approximately 38° to 40° gravity at 452 ft. A 6-hour bailing test indicated production of 50 to 60 bbl. a day, later settling to 35 bbl. Location is 3 miles west of Richfield Oil & Gas Co. test on the John D. Graham farm which last June got flush production of around 150 bbl. of 41°-gravity crude. Charles Nichols and Clarence Demaray of Kerwood drilled both wells. Bailey 2 on the Cipu farm completed around 450 ft., is good for about 20 bbl. a day.

In Middlesex County, near Strathroy, British Dominion Oil & Development Co., of Calgary, has leased acreage and is planning to drill a 2,000-ft. test on the John McVicker farm, 5 miles southeast of Strathroy.

Quebec.—In the Gaspe peninsula, Quebec province, Quebec Oil 1 deep test and Bald Mountain 1 are drilling on 24-hour-a-day basis. Tar Point 1 is completing installation of a new rig and will resume operations this month. Continental Gaspe 1 and Ventura 3 have plugged in and are getting ready to flow.



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Completions for 9 Months Show Small Gains, Both in Number and Total Footage

by Polly DeArmond

PRELIMINARY cumulative figures for 9 months' activity this year reflects small gains in both number of wells completed and in total footage drilled as compared with those for the same period last year. Completions totaled 32,613, an increase of 592 wells, or 1.8 per cent. Footage reached 125,253,026 ft., a gain of 8,219,751 ft., or more than 7 per cent.

The steady increase in depths to which wells are being carried is apparent in substantial gains in the deepest categories, with an accompanying decline in the shallowest depth classification. The greatest gain for the comparative period occurred in wells drilled below 12,500 ft.—up 48.1 per cent in 1951. Wells drilled to 10,000-12,500 ft. showed an increase of 15.1 per cent. The 7,500-10,100-ft. operations were up 13.7 per cent. The 5,000-7,500-ft. classification rose 5.9 per cent. Wells completed between 2,500-5,000 ft. were over 6 per cent ahead of 1950. The number of completions under 2,500 ft. declined 8.2 per cent.

Every area but two showed gains in number of wells drilled the first 9 months of this year against the previous year, with outstanding increases noted in the western half of the country.

The West Coast had 395 more wells, or 29.9 per cent, than for the period in 1950. The Rocky Mountain region (Montana, Wyoming, Colorado, Utah, the Dakotas, Idaho, and Nevada) jumped 206 completions, or 28.7 per cent.

The Mid-Continent division, including Oklahoma, Kansas, Nebraska, Missouri, and Iowa, was up 540 wells, or 7.6 per cent. Both the Appalachian area (New York, Pennsylvania, West Virginia, and Maryland) and Southwestern section (Texas, New Mexico, and Arizona) increased 1.8 per cent in completions: the eastern states up 40 wells, and Texas up 232.

Completions in the North Central states of Ohio, Illinois, Indiana, Kentucky, and Michigan, fell 602 wells, or 10.7 per cent. The Southern group (Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida, Tennessee, and Virginia) dropped 219 completions, or 9 per cent.

1951 Status

In total new completions, September ranks as the third most active month so far this year. Wells declined 657, or 12.5 per cent, below the record established in August, and were down 161, slightly more than 4 per cent, from the second highest figure reported in May.

In total depth drilled, September places third again. Footage was of 2,988,937 ft., or 17.4 per cent, from the year's peak set in August, and slipped 1,224,567 ft., or 7.9 per cent, under the second-ranking month of May.

For the first time in the history of the industry, the rigs and drilling figure passed the 6,000 mark.

SUMMARY OF COMPLETIONS, SEPTEMBER 1951

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	51	26	0	25	51	0	0	0	0	0	72,000	56
Pennsylvania	175	85	11	79	170	5	0	0	0	0	300,911	183
West Virginia	58	9	37	12	32	26	0	0	0	0	156,333	203
Maryland	6	0	1	5	0	5	1	0	0	0	26,842	33
Ohio	95	30	19	46	51	44	0	0	0	0	208,585	145
Kentucky	153	67	11	75	115	38	0	0	0	0	292,710	105
Illinois	244	90	1	153	91	153	0	0	0	0	609,121	266
Indiana	186	51	3	132	153	33	0	0	0	0	336,045	241
Michigan	55	18	0	37	32	23	0	0	0	0	132,997	140
Kansas	341	165	32	144	34	304	3	0	0	0	895,332	476
Nebraska	20	6	0	14	0	14	6	0	0	0	98,294	44
Oklahoma	427	231	18	178	120	222	58	18	9	0	1,567,482	912
Texas	1,280	791	50	439	314	438	364	130	25	9	5,953,220	1,939
North	192	107	0	85	69	92	30	1	0	0	654,304	274
West Central	194	85	2	107	77	86	31	0	0	0	627,989	281
West	413	332	3	78	62	83	205	42	12	9	2,345,294	796
Panhandle	51	23	22	6	9	39	2	1	0	0	159,313	101
Eastern	86	55	1	30	15	29	23	18	1	0	449,864	97
Gulf Coast	156	94	12	50	13	47	38	50	8	0	966,125	182
Southwest	188	95	10	83	69	62	35	18	4	0	750,331	208
Louisiana	177	96	14	67	47	22	37	38	23	10	1,103,727	281
Northern	107	54	11	42	47	21	26	13	0	0	411,775	118
Southern	70	42	3	25	0	1	11	25	23	10	691,952	163
Arkansas	37	23	0	14	9	22	4	2	0	0	135,642	46
Mississippi	31	9	1	21	0	3	20	5	3	0	216,899	35
Ala., Ga., Fla.	8	1	0	7	1	0	5	0	1	1	56,946	3
Montana	26	11	0	15	14	9	3	0	0	0	75,808	120
Wyoming	81	43	0	38	9	34	28	8	2	0	413,649	189
Colorado	39	20	2	17	1	13	23	1	1	0	196,018	72
Utah	4	2	0	2	0	1	2	0	1	0	25,699	40
New Mexico	72	32	31	9	14	22	13	13	7	3	406,226	233
California	231	169	2	60	86	88	32	15	8	2	902,095	263
Miscellaneous	§2	0	0	2	2	0	0	0	0	0	2,893	¶26
Total September 1951	3,799	†1,975	233	*1,591	1,346	1,519	599	230	80	25	14,185,474	‡6,051
Total August 1951	4,456	2,307	310	1,839	1,477	1,860	751	242	101	25	17,174,411	5,623
Total September 1950	3,747	2,023	258	1,466	1,413	1,478	586	184	74	12	13,584,146	4,890
Cumulative 1951	32,613	17,372	2,116	13,125	10,833	13,595	5,326	1,885	817	157	125,253,026	.....
Cumulative 1950	32,021	18,192	2,111	11,718	11,804	12,714	5,029	1,658	710	106	117,033,275	.....
Alberta, Canada	128	72	23	33	31	47	49	1	0	0	500,737	.....
Cumulative 1951	887	586	71	230	93	414	335	13	0	0	3,511,717	.....
Cumulative 1950	732	552	33	147	42	496	186	7	1	0	2,856,392	.....

*Incl. 123 service wells: N. Y. 25, Pa. 75, Ohio 6, Ky. 1, Ill. 1, Mich. 4, Kans. 2, Okla. 1, No. Tex. 6, S.W. Tex. 1, Calif. 1. †Incl. 32 condensate wells: Okla. 8, W. Tex. 1, E. Tex. 10, Tex. Gulf 7, S.W. Tex. 1, So. La. 3, Ark. 1, Miss. 1. ‡Incl. all wells rigged up and/or drilling at month end. §Incl. 1 Tenn. at 622 ft. and 1 No. Dak. at 2,271 ft. ¶Incl. 9 Tenn., 13 Dak., 2 Nev., 2 Idaho.

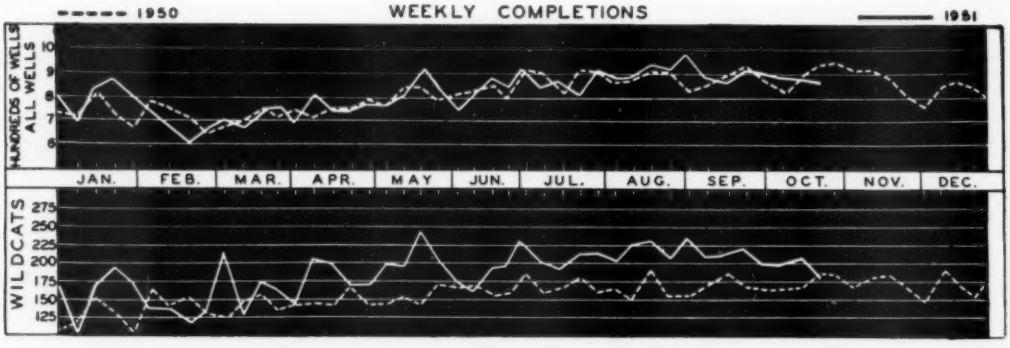
CURRENT STATISTICS

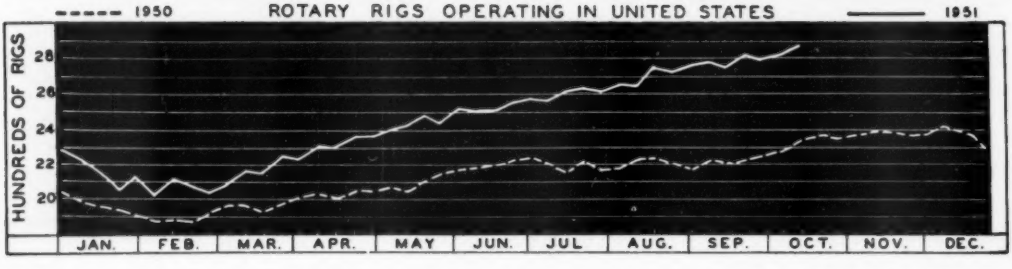
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED OCTOBER 20, 1951

	Total of all wells					Oct. 20		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	11	6	0	*5	15,807	526	568	0	0	0	0	0	0	0	0	0	0
Pennsylvania	31	12	8	†11	56,039	1,183	1,104	0	0	0	0	0	0	0	0	1	1
West Virginia	12	1	10	1	37,974	489	534	0	0	1	0	1	0	0	10	6	16
Ohio	23	7	6	‡10	51,926	772	824	0	0	0	2	2	1	0	5	22	28
Indiana	36	11	0	25	69,242	1,072	1,295	0	0	0	13	13	38	0	1	298	337
Kentucky	28	8	3	17	49,908	993	926	1	0	0	0	1	22	0	1	124	147
Illinois	57	24	9	33	149,555	1,903	2,264	2	0	0	13	15	63	0	0	450	513
Michigan	11	2	0	9	28,769	618	717	0	0	0	5	5	21	0	7	243	271
Kansas	66	27	7	§32	227,548	3,494	3,155	2	0	0	15	17	164	1	13	697	875
Nebraska	7	1	1	5	34,812	189	88	0	0	1	5	6	9	0	2	96	107
Oklahoma	115	60	10	45	419,614	4,474	4,349	1	0	0	12	13	147	4	18	574	743
Texas	278	180	11	87	1,315,352	13,325	13,191	14	2	4	46	66	597	48	98	2,734	3,477
North Central (Dist. 7-B & 9)	86	49	1	36	291,904	4,040	3,992	11	1	1	20	33	294	3	13	1,170	1,480
West (Dist. 7-C & 8)	97	84	0	13	499,418	4,044	3,963	2	0	0	5	7	147	10	6	511	674
Panhandle (Dist. 10)	7	4	1	‡2	24,964	574	744	0	0	0	1	1	2	0	0	23	25
Eastern (Dist. 5 & 6)	21	11	3	7	109,743	963	933	0	0	2	5	7	9	8	2	185	204
Gulf Coast (Dist. 2 & 3)	36	15	3	18	252,481	1,854	1,844	1	1	1	6	9	75	19	49	388	531
Southwest (Dist. 1 & 4)	31	17	3	11	136,842	1,850	1,715	0	0	0	9	9	70	8	28	457	563
Louisiana	57	35	5	17	337,120	1,746	1,973	3	0	0	6	9	34	9	7	232	282
Northern	33	20	5	8	92,004	960	1,056	0	0	0	3	3	9	0	4	139	152
Southern	24	15	0	9	245,116	786	917	3	0	0	3	6	25	9	3	93	130
Arkansas	13	9	0	4	44,745	335	324	0	0	0	3	3	13	1	3	69	86
Mississippi	4	3	0	1	30,586	284	255	2	0	0	1	3	14	3	0	115	132
Southeastern States	0	0	0	0	0	44	49	0	0	0	0	0	0	0	0	21	21
Montana	5	2	1	2	8,523	181	214	0	0	1	0	1	0	0	1	39	40
Wyoming	16	6	0	10	79,163	601	472	0	0	0	7	7	12	0	1	99	112
Colorado-Utah	10	3	1	6	50,350	239	75	0	0	1	3	4	7	0	5	113	125
New Mexico	20	8	7	5	109,158	537	498	0	0	0	3	3	16	0	8	62	86
California	51	39	1	11	208,957	1,856	1,442	1	0	0	7	8	42	0	4	363	409
Miscellaneous (Md., Mo., and No. Dak.)	3	0	0	3	11,427	62	46	0	0	0	3	3	1	0	20	25	46
Total United States	854	444	71	339	3,336,584	34,923	34,363	26	2	8	144	180	1,201	66	204	6,383	7,854
Total previous week	880	440	72	368	3,509,443	....	....	29	3	4	172	208	1,175	64	196	6,239	7,674
Total October 20, 1950	934	486	85	363	3,376,007	....	....	25	2	6	149	182	907	63	173	5,146	6,289

Service wells included: *5, †11, ‡1, §3.





DAILY AVERAGE PRODUCTION FOR WEEK

	Oct. 20 crude oil	B. of M. Oct. demand	Oct. 13 crude oil
Alabama	3,000	2,400	2,900
Arkansas	77,960	85,000	77,600
California	987,100	980,000	987,300
Colorado	77,700	77,000	75,800
Eastern	59,850	62,000	60,350
Florida	1,550	1,600	1,675
Illinois	171,100	165,000	167,400
Indiana	35,300	31,000	32,200
Kansas	322,500	320,000	312,100
Kentucky	33,000	31,000	31,800
Louisiana	618,850	664,000	618,400
North Louisiana	113,800	.....	113,350
South Louisiana	505,050	.....	505,050
Michigan	36,700	40,000	39,200
Mississippi	104,755	105,000	103,240
Montana	25,000	26,000	24,800
Nebraska	7,500	8,000	7,500
New Mexico	144,875	156,000	144,775
Oklahoma	508,300	530,000	507,100
Texas	2,86[illegible],475	2,720,000	2,864,475
Dist. 1 (Southwest)	34,725	.....	34,725
Dist. 4 (Southwest)	267,700	.....	267,700
Dist. 2 (Gulf Coast)	172,300	.....	172,300
Dist. 3 (Gulf Coast)	493,350	.....	493,350
Dist. 5 (Eastern)	55,075	.....	55,075
Dist. 6 (Eastern)	119,625	.....	119,625
East Texas field	270,500	.....	270,500
Dist. 7-C (West)	111,000	.....	111,000
Dist. 8 (West)	1,007,600	.....	1,007,600
Dist. 7-B (W. Central)	86,875	.....	86,875
Dist. 9 (N. Central)	161,500	.....	161,500
Dist. 10 (Panhandle)	84,225	.....	84,225
Utah	3,900	5,000	3,900
Wyoming	186,000	180,000	188,000
Total United States	*6,269,415	6,197,000	6,250,515
Change from previous week, up	18,900		
Canada	179,425	.....	164,085

Total U. S. production January 1-October 20 . . †1,791,286,525 bbl.
Same period last year (crude plus cond.) . . . . 1,560,350,740 bbl.

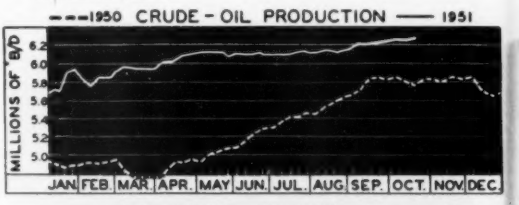
*Not including 105,265 bbl. condensate. †Including 30,760,905 bbl. condensate.

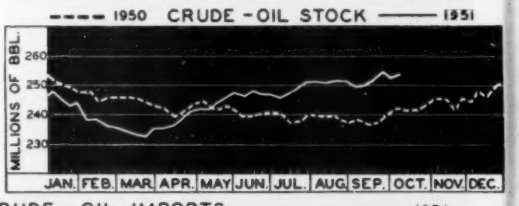
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

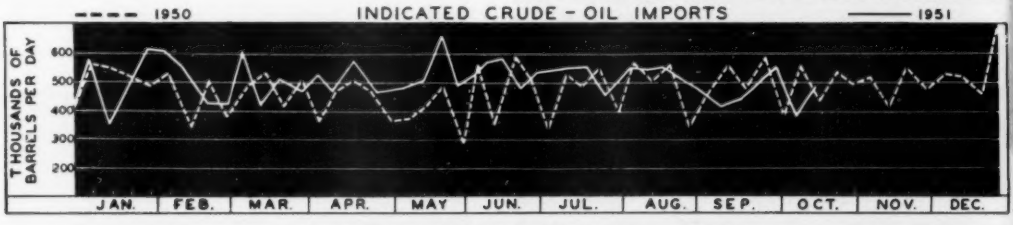
(Thousands of barrels)

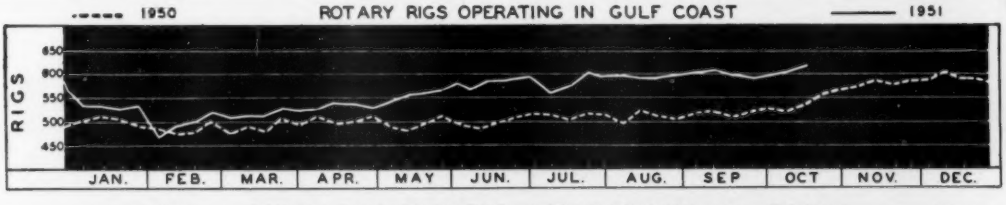
	Oct. 13, 1951	Oct. 6, 1951	Oct. 14, 1950
Pennsylvania Grade	1,960	1,996	2,335
Other Appalachian	1,597	1,702	1,344
Illinois, Indiana, Michigan	12,841	13,316	9,169
Arkansas	2,758	2,647	2,937
Louisiana	15,027	14,966	14,194
North	3,308	2,748	3,093
Gulf	11,519	12,218	11,101
Mississippi	3,340	3,245	2,399
New Mexico	7,157	6,993	6,925
Oklahoma and Kansas	39,639	38,350	36,565
Texas	120,651	121,818	117,740
East Texas	14,807	15,470	13,840
West Texas	50,937	50,777	46,692
Texas Gulf	27,013	26,443	28,357
Other Texas	27,894	29,128	28,851
Rocky Mountain	13,536	13,488	10,531
California	29,227	29,313	31,055
Foreign	6,701	6,201	5,923
Total	254,434	254,035	241,117

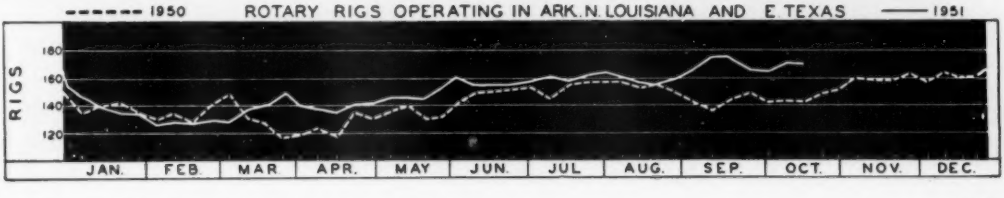
*Bureau of Mines.









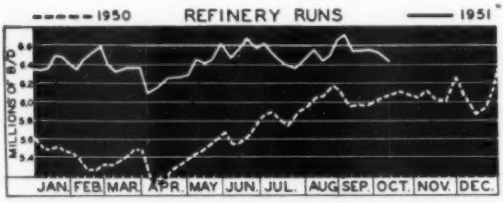

1950 ROTARY RIGS OPERATING IN ARK. N. LOUISIANA AND E. TEXAS 1951
RIGS
180
160
140
120
JAN. FEB. MAR. APR. MAY JUN. JUL AUG. SEP. OCT. NOV. DEC.

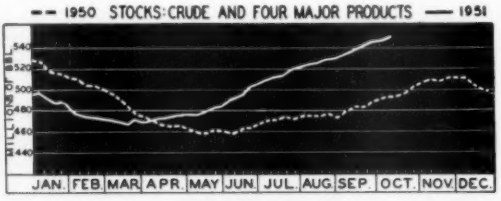
A.P.I. REFINERY REPORT, OCTOBER 13

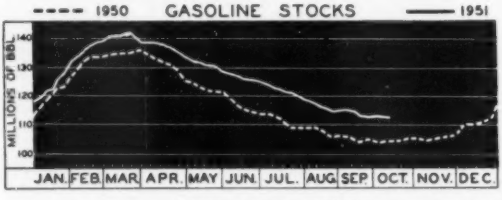
(Thousands of barrels)

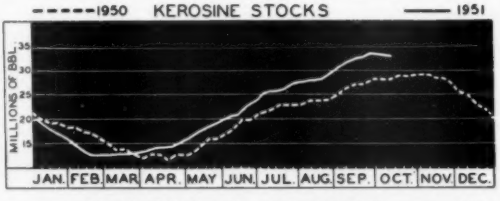
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, October 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	964	397.1	33.2	232.1	199.7	24,252	11,904	34,509	11,998	937	369.8	38.5	228.1	202.0
Appalachian:														
District 1	107	47.7	4.1	19.3	12.0	2,914	660	1,112	709	102	43.6	6.4	14.2	11.0
District 2	67	41.0	2.7	5.7	15.1	1,366	317	420	283	70	33.1	4.8	6.6	14.1
Ind., Ill., Ky.	1,117	585.7	73.0	174.6	143.4	23,223	7,484	21,575	6,233	1,086	572.9	62.9	190.6	155.4
Okla., Kans., Mo.	574	297.8	16.3	120.7	67.1	11,852	1,917	11,474	2,118	494	281.9	15.7	108.9	58.6
Inland Texas	267	176.0	14.4	37.0	39.3	3,811	643	1,752	1,263	215	146.4	12.7	31.8	39.2
Texas Gulf Coast	1,580	729.4	124.6	371.4	249.2	17,796	5,658	13,467	7,031	1,505	675.9	106.2	347.7	283.0
La. Gulf Coast	506	247.4	60.0	106.4	65.9	6,252	3,336	3,302	2,225	483	228.1	57.2	104.8	68.5
N. La. and Ark.	82	28.6	7.0	21.6	7.4	2,793	668	1,285	197	77	26.4	7.3	18.0	6.8
Rocky Mountain:														
New Mexico	14	7.9		2.7	3.9	118		79	37	14	7.3	.3	2.6	3.3
Other Rocky Mtn.	195	87.9	9.1	35.9	35.7	3,410	412	2,068	1,051	170	78.6	6.9	31.3	39.4
California	953	400.6	3.7	129.6	360.7	14,213	633	9,147	15,994	924	410.7	12.2	134.3	369.0
October 13, 1951	6,426	3,047.1	348.1	1,257.0	1,199.4	112,000	33,632	100,190	49,139	6,077	2,874.7	331.1	1,216.9	1,250.3
October 6, 1951	6,536	3,063.7	379.4	1,332.7	1,190.0	112,703	33,704	98,198	47,966					
October 14, 1950	6,124	2,870.0	338.0	1,267.7	1,210.3	103,807	28,555	80,959	42,910					

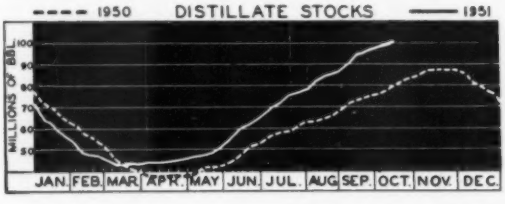
*At refineries including natural blended. †Finished and unfinished.

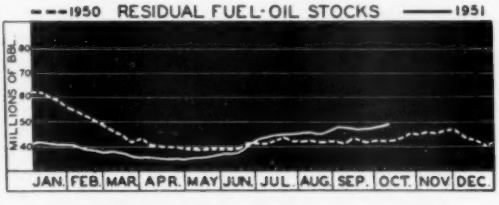


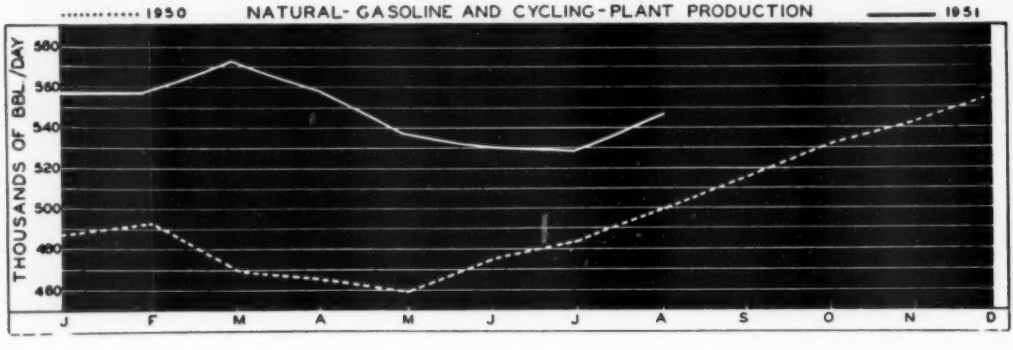












CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947.

‡Standard Oil Co of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.50
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above

DISTILLATE prices on the East Coast, particularly in the New York area, are remaining firm more from the influence of the probability of an increase in price ceiling than from actual movement out of primary storage. The Office of Price Stabilization has made no further announcement about possible relief for East Coast cargo suppliers since it was reported that the petroleum branch had requested permission from Director DiSalle to act on the matter.

Primary suppliers with any available storage on the East Coast are not pushing sales at current prices since tanker rates result in delivered prices that are higher than ceilings. Export shipments are reported to be off some since the first of the month.

Tanker rates have started upward again under a normal seasonal trend. Rates for single coastwise voyages are at about Maritime Commission base plus 75 per cent, up from MC plus 65 per cent a week earlier. The trend for a longer period is indicated by rates for charters covering voyages through 1952. For the period through December 1952, one fixture was reported at MC plus 90 per cent. This price would represent a transportation cost of 1.72 cents a gallon for No. 2 fuel. Spot rates during the winter months are expected to be even higher.

Light and heavy fuels are more readily available on the Gulf Coast, but the summer program of moving all available material to the East Coast for storage leaves the Gulf Coast area with some storage space.

Natural gasoline was offered and sold by at least one supplier last week at 6.5 for Grade 26-70 on Group 3 market. The reason for the cut was not explained, and all available material was taken at once. All prices were reported to be back at ceiling level of 6.875 cents for Group 3 and 6.375 cents for North Texas.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of October 22, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	9
No. 2 straw fuel oil	8-8½	9	8
No. 6 residual	$1.65-1.75	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅞	6⅜	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

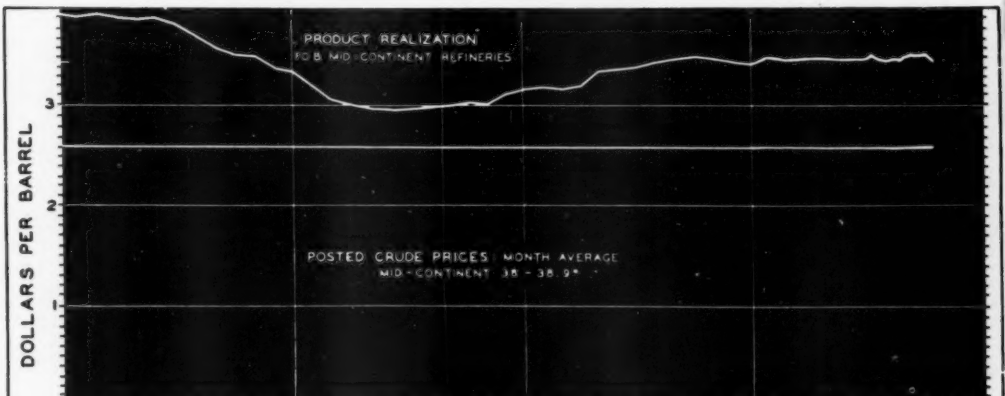
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	33.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES, MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.46 for week ended October 13, $3.54 for previous week, and $3.50 for October 1950.

EQUIPMENT MEN . . . in the News

Rockwell Names Munn As Assistant Sales Manager

R. J. MUNN

L. A. Dixon, vice president of Rockwell Manufacturing Co., has announced the appointment of R. J. Munn as assistant sales manager of oil-field products.

Munn has recently been working as a sales engineer of the Nordstrom Valve Division of Rockwell's Houston district office, and prior to that was in charge of the Corpus Christi office for several years.

Munn will transfer his headquarters to the Rockwell home office in Pittsburgh, and in his new assignment will assist H. Gottwald, general sales manager of the Nordstrom Valve Division.

Lindfors to Manage New York Belting-Packing Sales

Appointment of Wenzel A. Lindfors as sales manager of New York Belting & Packing Co. has been announced by B. F. Ruether, vice president. He will make his headquarters in the company's Passaic, N. J., plant.

In his new capacity, Lindfors will direct all sales for company's line of industrial rubber products.

A graduate of University of Minnesota, Lindfors was formerly president and treasurer of the James Ells Employment Service in Minneapolis. Until the time of his present appointment, he was factory representative for N. Y. Belting & Packing Co. in Minnesota, northern Wisconsin, North and South Dakota, and northern Iowa.

MacKenzie Named to Parker Sales Post

R. B. MacKenzie has been appointed assistant sales manager of The Parker Appliance Co., it has been announced by D. W. Holmes, vice president in charge of sales.

MacKenzie's primary assignment will be the coordination and handling of activities resulting from the Government's increasing defense-program requirements for Parker material produced by the company's fittings, valve, jet part, and rubber divisions.

MacKenzie came to Parker in 1941 from Pharis Tire & Rubber Co., Newark, Ohio, where he served as assistant advertising and sales promotion manager. His most recent assignment has been Parker sales engineer in the Philadelphia-Washington, D. C., area.

Lloyd Made Vice President By United States Steel

Robert M. Lloyd has been elected vice president, raw materials, of United States Steel Co., M. W. Reed, executive vice president, engineering and raw materials, has announced.

After graduating from University of Pittsburgh with a B.S. degree in electrical engineering, Lloyd completed several years work in metallurgy at Carnegie Institute of Technology. He first joined U. S. Steel as an employe in the sales department of Carnegie - Illinois Steel Corp. in 1926.

Lloyd was transferred to the raw materials department of Carnegie-Illinois in 1933 and after several promotions he was made assistant director of raw materials for the company. He was appointed assistant to vice president of the former United States Steel Corp. of Delaware in December 1945 and became assistant vice president of United States Steel Co. on January 1, 1951.

Analysis Firm Establishes Branch in Midland, Tex.

Chemical & Geological Laboratories, Casper, Wyo., announce the establishment of a laboratory and office in Midland, Tex., to serve the Permian basin with full diameter and routine core analysis. The branch will be known as Chemical & Geological Laboratories of Texas, located at 1700 West North Front Avenue, on the new highway from Odessa.

Manager of the Midland branch is Richard L. Brown, who was transferred to Midland from the chemical department in Casper where he has served since receiving his B.S. degree from University of Wyoming.

The equipment to be placed in service in Midland will be the same quality as that now being used in Casper and in the service branch at Edmonton, Alta., Canada. Full-diameter core study, the chief interest of the new laboratory, is adapted for the analysis of fractured and vugular limestones and dolomites.

J. M. Dumser Is Named Assistant Sales Manager

H. Y. Bassett, vice president and general manager of the Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co., announces the appointment of John M. Dumser as assistant to George D. Potter, general sales manager.

Dumser has had wide experience in the copper and brass-fabricating industry, having been connected with the industry since 1927.

Headquarters for Dumser will be at the general sales offices in Detroit.

Beaird Appoints McRoberts Manager Compressor Sales

E. S. McROBERTS

E. S. McRoberts, formerly assistant chief engineer of the J. B. Beaird Co., Shreveport, has been appointed manager of compressor sales of Beaird, as announced by J. L. Tullis, general manager of sales.

McRoberts has been with the Beaird company since 1944, and for the past 6 years has been active in the design and development of the Beaird packaged compressor plant which is widely used in gas conservation and oil production.

Prior to joining Beaird, McRoberts was associated with Frick-Reed Supply, Tulsa, in the engineering and construction division, and spent 7 years in engineering development work in the oil fields of East Texas.

A. H. Sy Promoted to Sales Vice President

Arthur H. Sy, formerly sales manager, has been named vice president in charge of sales for American District Steam Co., Inc., North Tonawanda, N. Y.

Sy has been with American District since 1923, serving in various capacities in production, engineering, and sales, becoming sales manager in 1946. He will have complete responsibility for main-office sales functions as well as supervision of five district sales offices in Buffalo, Chicago, New York, Philadelphia, and Pittsburgh and the 46 manufacturers' representatives serving the company in 70 principal cities.

General Controls Opens Two New Branch Offices

ELDON BURNETT

R. C. SERVAT

General Controls Co., Glendale, Calif., has opened two new branch offices at Omaha and New Orleans, according to an announcement made recently by J. F. Ray, vice president in charge of sales.

Eldon Burnett has been appointed manager of the Omaha branch, and Robert C. Servat has been named branch manager at New Orleans.

Burnett was formerly affiliated with Charles D. Jones & Co., Kansas City, before joining the company 3 years ago as a sales engineer. His new position will entail complete charge of all Omaha branch office territory activities. This includes sales, engineering, and service on the General Controls line of automatic controls.

Servat's new position will be in the same capacity as that of Burnett.

G.E. Promotes Black to New Divisional Position

C. Howard Black has been appointed general manager of General Electric Co.'s Meter and Instrument Department at Lynn, Mass., according to an announcement by Harold E. Strang, general manager of the G.E. Measurements and industrial Products Division.

Black, formerly manager of engineering for the G.E. Construction Materials Division, Bridgeport, Conn., succeeds Strang, previously named to his new post.

Black has been with G.E. since 1924, serving in various capacities in the switchgear department, engineering and manufacturing operations, and in 1948 was appointed manager of engineering for the Construction Materials Division.

Houdry Licenses World Commerce Corp.

Houdry Process Corp. has completed arrangements with World Commerce Corp. under which World Commerce will represent Houdry in negotiating foreign process licenses throughout the world, it was recently announced by Brig. Gen. D. N. Hauseman, president.

It is expected that the new arrangement will materially expedite dissemination and use of scientific advances made by Houdry for the production by catalytic processes of high-grade petroleum products, high-octane gasoline, petrochemicals and synthetic-rubber materials.

In addition to licensing of Houdry processes covered by Houdry patents abroad, arrangements between the two companies will make available engineering and design services in the over-all field of petroleum refining, and the facilities of the Houdry laboratories at Linwood, Pa. In addition, Houdry will make available consulting engineering, construction, and technical services.

World Commerce maintains its principal American office in New York City and its other offices in Panama, Paris, Madrid, Frankfurt, Milan, London, Zurich, Tokyo, Rio de Janeiro as well as in Canada. The headquarters of Houdry is in Philadelphia.

C. W. Potthoff Joins Stewart & Stevenson

C. W. POTTHOFF

Charles W. Potthoff has joined Stewart & Stevenson Services, Inc., of Houston, as assistant manager of the parts department, as announced by Joe Manning, general manager.

Before affiliating with Stewart & Stevenson, Potthoff was with the Parts Association, Cleveland. Previous to that he was in the parts department of Dow Motor Co., Houston, for 19 years.

Westinghouse Will Supply Pipe-Line Equipment

Westinghouse Electric Corp. will supply approximately $1,160,000 worth of electrical equipment for a new 550-mile-long common-carrier pipe line linking the West Texas fields with refineries and pipe-line connections in the southern and eastern parts of the state.

Five companies will pump crude oil from their production fields to a tank farm at Colorado City, where the first station of the new line will give the oil an 800-psi. push through 134 miles of 26-in. line to Ranger. Booster pumps will add a like pressure to carry the oil another 142 miles to Wortham, about 60 miles south of Dallas. Here, the system will divide into a 114-mile, 20-in. line to Longview, and a 164-mile, 24-in. line to Lucas, near Beaumont.

The pipe line will have motors for centrifugal drives, with centralized control automatically sequencing each pump motor through its associated valves and auxiliaries. It will feature the largest concentration of remote tank-farm and pump-manifold controls thus far centralized on a control console. The consoles will be of the piping-diagram type, and one of them will control more than 100 valves and 11 booster pumps.

Initially, three pumping stations will operate the system at about 300,000 bbl. per day. Provision will be made for the future addition of four intermediate stations, to increase the throughput to about 440,000 bbl. per day.

Design and construction of the line are being handled by Gulf Oil Corp.

(Continued on page 197)

Los Angeles Basin A.P.I. Chapter Meets at Long Beach

Officers and guests of the Los Angeles Basin Chapter, A.P.I., at a recent meeting in Long Beach, Calif., are: A. H. Curran, Jr., Schlumberger Well Surveying Corp., assistant secretary-treasurer; William Anderson, Oil Tool Corp., secretary-treasurer; Stafford Park, Fullerton Oil Corp., vice chairman; John McMahon, McMahon Manufacturing Co., guest; W. B. McMahon, McMahon Manufacturing, guest; C. G. Gandaubert, General Petroleum Corp., chairman; J. J. Browne, General Petroleum, guest speaker who with E. C. Yerby, Richfield Oil Corp. (not shown), presented a description of the McMahon jet oil-well pump; Eldon Hair, General Petroleum, chairman, membership committee.

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EQUIPMENT FOR SALE

FORT WORTH Jumbo Spudder with or without tools. No Engine. Near Oilton, Oklahoma. Just finished 3000 ft. hole. Priced to sell. Doak Drilling Co. Write or Phone, 1579 Bristow, Oklahoma.

FOR SALE: 1 Buckeye Model 11 trencher with Buda gasoline engine. Contact Natural Gas Service Company of Arizona, Box 127, Coolidge, Arizona, Telephone 4481.

FOR SALE: Model 61 Wichita Spudder, complete with 150 H.P., LeRoi Drilling Engine, all tools, dog house, light plant, and Shear Pole Mast. Rig is mounted on 12" I Beam Skids. Located in West Texas. Box E-415, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

R. L. Double Drum Cardwell Spudder, complete with tool, Dog House and mast. Telephone 6-9234, Oklahoma City, Oklahoma.

SPECO TOOL COMPANY

Oil Field Maintenance & Repair Machine Shops

We buy and sell all types of used oilfield equipment.

Salem, Ill. Phone 915 — **Crossville, Ill.** Phone 841

FOR IMMEDIATE DELIVERY

#1 Seamless Used Casing and Tubing

10,000'—5½" O.D. 14#-15.50#-17# 8 rd. thd. R-2
3,000'—7" O.D. 17# 3 rd. thd. R-2
10,000'—2⅜" O.D. 4.60# Non-Upset 10 rd. thd. R-2

#1 Lapweld Used Casing and Tubing

10,000'—5½" O.D. 17# 11½ thd. R-1
5,000'—6⅝" O.D. 13#-17# 11½ thd. R-1
5,000'—7" O.D. 17# 10 V thd. R-1
10,000'—2⅜" O.D. 4.50# 11½ thd. R-1
10,000'—2⅜" O.D. 3.75# T&C Used Line Pipe #1 & 2 Grades

THE BUCKEYE SUPPLY CO.
18 Harrison Street, Zanesville, Ohio

PIPE THREADING MACHINES

3—#8 Oster Rapiduction, 2½" to 8", 1942
2—6" Landis, 2½" to 6", Late
1—8" Landis, M/D, Late
1—2" Landis, Late
1—#316 Oster, 1¼" to 6"
1—#304 Oster, 1" to 4"

O'Brien Machinery Co.

Div. A, 1545 N. Delaware Avenue
Philadelphia 25, Pa. GArfield 6-1150

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

SPUDDER Cardwell R L. Complete 5½ and 6" with 6500 ft. new drilling line. 5500 ft. sand line all in first class condition. Three and one-half years old. Phone 310. Kay Drilling Company, Box 273, Ulysses, Kansas.

7 ACRES OF OIL FIELD BARGAINS. Waukesha GAK 165HP Drilling unit, good, $2,500; 3 OCS chain driven sand reels, calf wheel, 6" x 5" Newton falls rig, timbers, good wheels, 14 inch brake wheel; Stems, bits 18" to 5", bailers, sand pumps, everything in cable tools; National No. 2 drilling machine only $1,500. Write, phone or call McGinnis, Tri State Tool & Supply Co., Phone 7-5121, 36th at Jefferson, Box 827, Parkersburg, West Va.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 30-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT FOR SALE

PIPE

ALL SIZES; LINE PIPE AND CASING, TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1298, DRUMRIGHT, OKLA.

IMMEDIATE delivery complete workover Jackknife rig, and Lowboy mounted Cardwell, Model L, Power Waukesha GKU with 67 double leg mast and wire line and substructure. Details and price on application. Box 3246, Corpus Christi, Texas.

FOR SALE

National 50 Type Rotary Rig

Equipped with National Drawworks, Table, Pump and Blocks. Byron Jackson Hook, Two Diesel Motors rated 153 BHP Each. Lee C. Moore Portable Mast and Base. Two Steel Dog Houses and Lite Plants. New or used 4½" Drill Pipe and Joints. Rig is mechanically good and complete in every detail. Priced right for good investment. No Commissions paid. Inspection Invited. Inventory List available. Address replies to Box 417, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

Desirable Line Pipe, Tubing and Oil Country Goods

ONCE USED SEAMLESS TUBING, TESTED 1,000# P.S.I., THOROUGHLY RECONDITIONED, ENDS READY FOR WELDING:

100,000' 2¼" O.D. x .140" Wall 3.2# 14' Lengths and Over.
50,000' 3½" O.D. x .140" Wall 4.8# 14' Lengths and Over.
80,000' 4" O.D. x .150" Wall 6.5# 14' Lengths and Over.

EXCELLENT FOR HIGH PRESSURE LINE:

30,000' 3" O.D. x .220/.270" Wall 7.5# New Seamless 30'-40' Lengths.
75,000 3" O.D. x .300/.400" Wall 10# New Seamless 30'-40' Lengths.
12,000' 8⅝" O.D. 28# New Wrought Iron Line Pipe, B.E., 21' RML.
5,000' 14" O.D. x .375" Wall 55# New Seamless 20' Lengths.

OIL WELL TUBING AND CASING:

20,000' 5½" O.D. 14# Good Used Lapweld Range 1 T&C, 11½ V-Thread Casing.

SIZES RANGE FROM ¼" TO 36" O.D.

OTHER SIZES NEW AND USED CASING, TUBING, LINE PIPE & SEAMLESS TUBING

FOR FULL DETAILS, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

4946 Murdoch, St. Louis Mo. SIdney 1791 (Day Phone) HUdson 8152 (Night Phone)

EQUIPMENT FOR SALE

OIL REFINERY EQUIPMENT

We have purchased oil refinery equipment from Cities Service Oil Company. To be sold for use, before demolition is started, as follows:

(AT EAST BRAINTREE, MASS.)

A: SHELL STILLS:

11 Shell Stills 14'x40', each on brick foundations. 5 brick chimneys 5'x50' each.

B: ONE BADGER ATMOSPHERIC UNIT —CONSISTING OF:

1 Pipe still heater—steel & brick with tube supports, tubes and return bends.
1 Primary Tower 5'-6"x67'-6" with 17 internal trays.
1 Secondary Tower 8'x67'-6" with 9 internal trays.
1 Kerosene Stripper 3'x16'-10" with 4 internal trays.
1 Fuel Oil Stripper 3'x31'-7" with 8 internal trays.
2 Water Separators 3'x9'.
20 Exchangers, Coolers, Condensers various sizes, Copper Tubing & Coils.

C: ONE BADGER ATMOSPHERIC UNIT —CONSISTING OF:

1 Pipe still heater—steel and brick with tube supports, tubes and return bends.
1 Primary Tower 10'-6"x67'-10" with 30 internal trays.
1 Kerosene Stripper 2'-6"x12'-0" with 4 internal trays.
1 Fuel Oil Stripper 2'-6"x12'-0" with 4 internal trays.
1 Water Separator 3'-0"x9'-0".
20 Exchangers, Coolers, Condensers, Various Sizes, Copper Tubing and Coils.

D: EQUIPMENT COMMON TO BOTH ATMOSPHERIC UNITS:

1 Brick Stack 5'-6"x100'.
1 lot structural steel, approx. 250 tons, supports, channels, H beams.
1 Pump House, concrete floor and foundation, brick walls, transite roof, 16'-2"x102'-0"x12'.
1 lot pipe, approx. 25,000', 4", 6", 8"; valves and fittings.
1 lot control equipment.

E: RUNDOWN TANKAGE:

19 2500 BARREL RUNDOWN TANKS 30x20'.
1 lot pipe, approx. 20,000', 6", 8", 10", 12"; valves and fittings.
1 lot overhead pipe supports, approx. 100 tons.

F. RECEIVING HOUSE ATMOSPHERIC UNIT:

1 lot cast iron plug valves and piping, approx. 250 tons.

(AT ST. ROSE, LA.)

G: 2 SETS TURBO GENERATORS — CONSISTING OF:

2 Curtis Steam Turbines, each 4-stage, 125 lbs. pressure. Serial Nos. 27819 and 27820—and 2 G.E. A-C Generators Type ATB-2-375 KVA each, 3600 RPM, 300 KW, 361 AMP, PF 80%, 600 Volts, 60 Cycles. Serial Nos. 2006043 and 2006058.

H: INGERSOLL-RAND COMPRESSORS:

17 x 10. Serial No. 46232.

I: PRIMARY TOWERS, WELDED:

5' Dia. x 25'. 15 Bubble Trays, 25 Bubble Caps per tray, 1½" coil. 12" gas inlet, 8" outlet on top. 4" plug outlets on bottom. 3" gas take-off at 5th and 10th trays. 4" fluid take-off at 5th, 10th and 15th trays.

Railroad siding and equipment for loading on cars or barges available. Representative on premises.

J. C. BERKWIT & CO.
551 FIFTH AVE., NEW YORK 17, N. Y.
MUrray Hill 2-2214

EQUIPMENT FOR SALE

FOR SALE: Ideal slush pump, Mode C-150. Melton Supply Company, Seminole Oklahoma.

90 H.P. Clark Direct driven Horizontal Gas Engine Compressor, 16"-14" x 20". Includes fuel injector adaptor. Mill Creek Gas & Oil Company, Box 509, Clarion, Pennsylvania.

AS IMPORTERS of Steel we can furnish you with European or Japanese Steel Products of all types. Let us have your inquiries. Hemisphere International Corp., 1404 Hibernia Bank Bldg., New Orleans, La.

WILSON Mogul draw works, 145 HP Waukesha, unitized on steel skids mounted on 50 ton tandem lowboy, 90' double poles 100,000# capacity, steel substructure, rotary table, blowout preventer, swivel, light plant, 7 x 14 mud pump. Rig now working. Wilson Super draw works, 140 Waukesha, 56' double poles mounted on 10 ton Mack truck, 6 x 12 mud pump, steel substructure, rotary, swivel. Both rigs have all tools and accessories to drill to 3500' or workover to 8000'. Gardner-Denver 5 x 8 High Pressure mud pump, 140 HP Waukesha. Wilson Mogul Coring Unit complete with Ford Industrial Motor and Transmission, 7500' line, Baash-Ross Coring Block and Reed wireling core Barrel. Price $60,000.00 for entire lot or prices quoted on individual items. Driscoll Drilling Company, Box 388, Driscoll, Texas.

PIPE LINERS—3800—6" Short Dresser Couplings w/ Bolts Less Gaskets. 1,500 Available for Immediate Delivery. Printy Pipe & Supply, Cut Bank, Montana.

FOR SALE: Approximately 40,000 ft. of 2⅞" O.D. Range 2, 10 and 8 round thread tubing. Suitable for shallow wells, or No. 1 line pipe. Located in Oklahoma City. Call Moran Pipe & Supply Co., Inc. Phone 3-3595, or write Box 2686, Tulsa 1, Oklahoma.

SPEED STAR 71, fully equipped. Truck mounted. Immediate delivery. G. J. Stumpff, Box 1107, Goodyear, Arizona.

FOR SALE: One Bucyrus-Erie 36 L Spudder three and one-half years old. Complete top and bottom tools 15½ to 5½. Also complete tailing in tools. All in first-class condition. List on request. J. E. Griggs, 310 East Third St., Mt. Carmel, Illinois. Phone 959.

SPUDDERS, BUCYRUS, Wichita, Fort Worth, also rotaries and core drills. Good used equipment, tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colorado.

JENSEN 18 D 30.44 hp. pumping unit. 20 hp. Wagner Electric Motor. 2626 ft. 6-in. O.D. 15 lb. Seamless Casing. 3200 ft. 5½-in. O.D. 12 lb. Seamless Casing. Tulsa Supply Co., P. O. Box 294, Tulsa, Oklahoma.

OILFIELD ENGINES

Because of electrification of our leases, we offer 23 FM. 118 and 208 engines, all in good condition, located in Stinnett, Texas, Field. For particulars: J. Ray Mendenhall, 77 West Washington St., Chicago, Illinois.

10,000 ft. 5½ OD 11 Pound PE line pipe. Price 80c. 1500 No. 1 couplings with double dutchman for 8⅝ OD Standard line pipe. Price $1.75 each. 20,000 ft. 2" 3.75# T&C line pipe. Price 26c. Lee Morrison Supply Company, Phone 277, Bartlesville, Okla.

FOR SALE: ONE 3A National Spudder with a Young drilling Clutch, with a JL 1335 Buda Engine. Without tools. C. L. Hinds, Box 194, Ulysses, Kansas. Phone 251.

BUCYRUS-ERIE 28-L, trailer mounted, in first class condition with 65 ft. telescoping derrick and complete with casing tackle strut, auxiliary A-frame leg, and 4 sheave casing blocks. Powered by a D-315 Caterpillar Diesel. Price our yard is $12,000. Duval Drilling Co., 6505 Normany Blvd., phone 8-5711, Jacksonville, Fla.

FOR SALE: Complete rotary rig. Two pole telescope mast. Wilson-Snyder Mud Pump. Good condition and ready to go. Write Bier & Vanderpoel, Box 693, Plainview, Texas.

FOR SALE: One super model Wilson single drum servicing unit, 80 hp. Waukesha, 1,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

EQUIPMENT WANTED

WANTED: Suitable unitized portable drilling rig; 3,000 to 3,500 foot capacity; complete with 3,500 feet of 3½" EUE drill pipe, min. 7½ x 12 pump; mast, etc. Send full details and quote price F.O.B. loaded cars, to American Northland Oil Company, 127 Montgomery St., San Francisco, Calif.

WANTED: 15/25 KW—Gasoline or Diesel Generating Unit. 220/440 Volts—60 Cycle, 3 Phase. Red Head Oil Producing Co., Brilliant, Ohio.

WANTED IMMEDIATELY: Good used or new 8⅝" 24 lb. and 7" 26 lb. casing. Prefer location in or near Pennsylvania. Box E-416, The Oil and Gas Journal, Tulsa, Oklahoma.

WE BUY drilling equipment, machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

WILL TRADE for new pumping units, 300' 16⅝" Casing; 1400'—13⅜"; 2000'—10¾"; 4000'—8⅝"; all good threads—good condition. Will also trade excellent 3-A National Machine complete with diesel power, tools, etc.—want new pumping units. Address Box 285, El Dorado, Kansas.

WANTED: Triplex Type Pumps, minimum 500 barrels per day capacity at 1,000 PSI and 0 to 10 PSI suction and up. 1" Regular Black Line Pipe; 1" long collar line pipe and 1¼" upset tubing. Must be in good condition. Lynch Oil Company, P. O. Box 914, Evansville, Indiana.

WANTED FOR CASH

Oil Well Type Motors in ratings 15/30-20/50-25/65 or 35/75 Horsepower. Will buy other type motors.

ALLIED ELECTRIC & MACHINERY CO.
1007 Falls Bldg., P.O. Box 1838
Memphis 1, Tenn.

HELP WANTED

DRILLING ENGINEER wanted by growing independent oil company in West Central Texas. Must be graduate petroleum engineer with two or three years of experience in drilling operations. Please reply by letter furnishing complete personal data, experience, age and starting salary desired. Recent small photo or snapshot would be helpful. Interview will be arranged if justified by data furnished. Box E-395, The Oil and Gas Journal, Tulsa, Oklahoma.

ALBERTA

CANADIAN CHEMICALS COMPANY, LTD.

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EXPERIENCED CANADIAN PERSONNEL ONLY

Chemical engineers for production supervisory positions in Petrochemical & Cellulose Acetate divisions.

Experienced men for production supervisory positions in Yarn & Staple Fibre Division.

Reply with personal background, education, experience, and salary expected. Personal interviews will be arranged.

All replies will be held confidential.

ADDRESS REPLIES TO
PERSONNEL SUPERINTENDENT
CELANESE CORPORATION OF AMERICA
BOX 148
BISHOP, TEXAS

HELP WANTED

PETROLEUM, mechanical, civil engineers for oil company training program. Geologists with under 3 years experience, preferably having one year graduate work, or 50 semester hours geologic courses. Petroleum, mechanical, civil engineers out of school 1 to 2 years. Age limit 31. Experienced oilwell supply store managers and salesmen. No fees. Oil Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974.

MECHANICAL engineer with degree, three years model shop experience. P. O. Box 2486, Kansas City, Mo.

WANTED
Research and Development Engineer capable of taking charge of department with Oil Field Equipment Manufacturer. Reply giving complete resume stating age, education, experience, positions held, and salary expected. All replies confidential. Box E-348, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

CHEMIST with technical background and thoroughly familiar with latest method of analysis of light hydrocarbons. Send complete record of education, experience and minimum salary expected. Box E-381, The Oil and Gas Journal, Tulsa, Oklahoma.

WAREHOUSEMAN — Oilfield, for small wildcat operation in Arabia. Must be capable assuming full responsibility ordering, stock control, disbursing. One year contract. Top wages. Living furnished. No family accommodations. Reply stating age, education, experience, to Box E-408, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SECRETARY—Age 35 to 45, for independent oil company in Oklahoma City. Must be expert stenographer, well experienced in oil production and operations. Must have excellent character and references. Sal. $350. per mo. with raises commensurate with ability. P.O. Box 1824, Oklahoma City.

HELP WANTED

WANTED: Petroleum Engineer versed in Gas Measurement and Gas Testing. Location South Central Louisiana. House, utilities, salary $247.50 per month. State age, education and experience. Box E-403, The Oil and Gas Journal, Tulsa, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-264, The Oil and Gas Journal, Tulsa, Oklahoma.

PUBLIC RELATIONS MAN AND WOMAN WANTED

Incomes Are Exceptionally High

QUALIFICATIONS: Men must be over 30. Women must be over 25. Education, personality, and dress are very important. Must furnish own transportation. Car not essential. Experience in oil exploration, geology, or engineering is preferred but not necessary. Experience in public relations is necessary. Accepted applicant will travel and will represent technical service company. All replies held strictly confidential. No references checked without permission. Enclose full length picture, letter of application, age, background.

Box E-423, The Oil and Gas Journal, Tulsa, Oklahoma

POSITION AVAILABLE

CHIEF PETROLEUM ENGINEER IN CHARGE OF ALL PRODUCTION AND DRILLING OPERATIONS

With active independent producer having extensive operations in Texas. Must be highly qualified. All replies will be kept in strictest confidence.

Box E-405, The Oil and Gas Journal, Tulsa, Oklahoma

CAREER OPPORTUNITY FOR CHEMICAL ENGINEERS

Southern California

RESEARCH ENGINEERS Work is in the field of unit operations, with emphasis on heat-transfer and distillation. Must have advanced degree in chemical engineering and three years or more experience in unit operations, plant-design, or process development for the petroleum or chemical industries. Should be familiar with construction and operation of pilot-plants or full scale commercial units.

PROCESS ENGINEERS Prefer men with advanced chemical-engineering degree. At least two years experience in process design of petroleum refining or petro-chemical process plants. Must be able to meet customers.

Please send a detailed summary of your education, experience, and personal history. Also include a recent photo of yourself. All replies will be kept confidential. Address your letter to Personnel Department.

C F BRAUN & CO

Engineers Fabricators Constructors Consultants

1000 South Fremont Avenue Alhambra, California

WANTED - ENGINEERS For WORK in TULSA, OKLA.

Squad Leaders and Draftsmen
Instrumentation
Mechanical Design
Structural
Piping
Electrical
Plant Layout

Contact Chemical Plant Division of

BLAW-KNOX CONSTRUCTION CO.
P.O. Box 1284, Telephone 54-5227
Tulsa, Oklahoma

SITUATIONS WANTED

GEOLOGIST with years of domestic and foreign surface and subsurface experience desires position with an aggressive exploration or progressive independent company in the Rocky Mountain Area. Box E-384, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box E-396, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Desires stateside or foreign employment, three years experience, exempt from military service. Box E-411, The Oil and Gas Journal, Tulsa, Oklahoma.

ASPHALT CHEMICAL ENGINEER
Twenty-five years technical and scientific experience in asphalt technology. Seeks responsible position as production manager or supt. in asphalt refinery, and/or director product development, technical service, specialties, emulsions, paving practice.
Box E-421, The Oil and Gas Journal Tulsa, Oklahoma.

Operator desiring to open a Denver Basin or Rocky Mountain Office?

PETROLEUM EXECUTIVE

18 years well rounded experience, age 40. Qualified by U.S. & Foreign Experience as geologist, petroleum engineer, and trained in modern office management. 5 years in Colorado in leasing, exploration production management, and well location and completions in Denver Basin. Good Health, Excellent references. Phone Denver East 8781, or write Box E-420, The Oil and Gas Journal, Tulsa, Okla.

SITUATIONS WANTED

GRADUATE petroleum engineer desires field work with independent. No field experience. Presently employed and for past two years as reservoir engineer with major oil company. Veteran, 32, married. References. Box E-418, The Oil and Gas Journal, Tulsa, Oklahoma.

POSITION DESIRED with aggressive organization requiring services of graduate Petroleum Engineer where all around experience in production, drilling, administration and personal contact essential. Box E-422, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED EXECUTIVE
ADMINISTRATIVE ASSISTANT
GRADUATE PETROLEUM ENGINEER, 39 years of age, 18 years experience covering Planning, Engineering and Administrative assignments in the Drilling, Producing and Pipeline Divisions of the Oil Industry including Purchasing, Inventory, Material Control and Sales Duties. Staff assignment P.A.W. programing materials last war. Presently employed by Industry in Supervisory capacity; desire change, must be permanent, with aggressive and well established Independent Oil or Gas Company. Prefer to locate in Houston. Box E-390, The Oil and Gas Journal, Tulsa, Oklahoma.

RECENT graduate, with B. Sci. in geology, seeks employment with major oil company as Jr. Geologist. Prefer Rocky Mountain or Mid-Continent area, but will go elsewhere. Married, 27, veteran. Box E-397, The Oil and Gas Journal, Tulsa, Oklahoma.

MR. INDEPENDENT OPERATOR: Are you looking for that capable superintendent, who can take over all of your operational worries and problems? Twenty-one years' experience: drilling, completions, production (flowing-pumping), workovers, salt water disposal, secondary recovery, compressor gas plant construction, practical petroleum geologist, University of Oklahoma graduate in petroleum engineering, Mid-Continent and Rocky Mountain experience. Responsible jobs with majors. Presently employed as superintendent; available November 1. Reason for change: desires to establish residence in one locality to rear family in normal manner. Box E-400, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

FOR SALE—MAPS

NORTH DAKOTA MAPS—Base Map of North Dakota: County outline, Township and Range, location of wells and Operators name with total depths. Oil and Gas Fields. 1" = 8 miles. Price $5.00. COUNTY MAPS: Fee ownership and lease with expiration dates. Scale 1" = 4,000 Ft. Northwest Mapping Co., 117½ Fourth St., Bismarck, North Dakota.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908 Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

BUSINESS OPPORTUNITIES

ATTENTION—MANUFACTURERS
Will sell outright, Patent #2,527,456 covering torque and/or tension measuring means for tong arms. Box E-409, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

160 ACRE offsets and semiproven leases located in Stephens, Caddo and Grady Counties, Oklahoma. Small bonus and a well. Average depth 6000 to 8000 ft. This offer only to those experienced and regularly engaged in the oil business. J. S. Graham, Box 572, Chickasha, Okla.

FOR SALE: Oil and Gas Leases in shallow territory. If interested in a good development proposition near oil producing wells write or wire W. P. Harley, Bowling Green, Ky.

LEASE AND DRILLING BLOCKS

ATTRACTIVE virgin structures, North-central Tennessee. Write me. N. M. Sauls, Cookeville, Tenn.

INTERESTED in drilling several wells not over 4,000' in North Texas by December 15th. Give complete description and full details, Box 4343, Dallas, Texas.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2183, Denver, Colorado.

UNIT No. 1: N½SE¼, SW¼SE¼ of Section 14, Township 3-North Range 1-West, containing 120.00 acres, more or less, the same being within the ceded portion of the Shoshone or Wind River Indian Reservation, Fremont County, Wyoming. Unit No. 2: NE¼ of Section 14, Township 3-North, Range 1-West, containing 160.00 acres, more or less, the same being within the ceded portion of the Shoshone or Wind River Indian Reservation, Fremont County, Wyoming. Brinkerhoff Drilling Co., 604 Continental Bldg., Dallas 1, Texas.

OIL LEASE—4½ forties in Beauregard Parish, Louisiana, deep pay area, between three shallow exploratory "drys," presently leased. Lease to reliable company, or, bona fide drilling proposition considered. No mail or telephone inquiries. Alice Dickinson et al., Lake Arthur, La.

I OFFER production oil properties in West Virginia and Marion County, Illinois. Large income. John Stouppas, 175 E. Long St., Columbus, Ohio.

COCHISE COUNTY ARIZONA drilling block 10,000 acres for 5000 ft. test. No bonus. G. J. Stumpff, Box 1107, Goodyear, Arizona.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
8835 Delmar Ave., St. Louis 5, Mo.

LIQUIDATING ESTATE

AT ATTRACTIVE PRICE

Developed Oil Properties in Bradford Field, McKean County, Pa. 122 Wells Drilled in 1947 equipped with new material—Depth 1850 feet. 68 electric jack-automatic controls. 3 powers. 1 water pressure plant. These properties can be water flooded with good future oil possibilities.

Box E-419, The Oil and Gas Journal, Tulsa, Okla.

WANTED OIL INTEREST

I am in a position to furnish oil country tubular goods: casing, tubing, etc., for interest in well for depth up to and including 6,000 ft. Wire or call collect your offer to

DAVID A. SCHLACHTER
6105 Del Norte Lane, Emerson 6028
DALLAS, TEXAS

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SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

FINANCING

YOUR FINANCING PROBLEM can be solved at moderate cost. For details write Box E-341, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE SERVICE

RECORD TAKE-OFF, available. Listing all Oil leases and assignments as recorded in Grant County, at Carson, North Dakota. Giving complete information. Also monthly continuations made. Write P. O. Box 344, Carson, North Dakota.

LEGAL

Sealed bids for Oil and Gas Mining Leases on restricted tribal and allotted lands of the Fort Berthold Indian Reservation, North Dakota, will be received at the Office of the Superintendent of the said reservation, Elbowoods, North Dakota, until 4:00 P. M. Central Standard Time, on November 15, 1951, and will be opened immediately thereafter in the presence of such bidders as may attend. This sale will be conducted under regulations as amended and promulgated by the Secretary of the Interior, 25 CFR 189, (Act of March 3, 1909, 35 Stat. 781, 783; 25 U. S. C. 396), governing the leasing of allotted land and 25 CFR 186 (Act of May 11, 1938, 52 Stat. 347; 25 U. S. C. 396 a-f), governing the leasing of tribal land. The lands involved in this sale are located in Townships 151 North and 152 North, Ranges 94 West and 95 West, McKenzie County, North Dakota, which is located in the Fort Berthold Indian Reservation. There are approximately 15,516.78 acres of allotted lands and approximately 1,774.08 acres of tribal lands available for lease as a single block at so much per acre bonus. For full particulars and additional information, such as description of lands, terms of leases, etc., call or write the Superintendent of the Fort Berthold Agency, Elbowoods, North Dakota. R. W. Quinn, Superintendent.

LEGAL

U.S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that two parcels of land containing approximately 27.5 acres in the Red River oil field, Tillman County, Oklahoma, will be offered for oil and gas leasing through competitive bidding at 1 p.m., Eastern Standard Time, on December 5, 1951, when bids will be opened. Details of the lease offering, how and where to file bids and a description of the lands may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

LEGAL

100.75 ACRES of individually allotted, restricted Indian land, located in Sections 27 and 34, Township 13 South, Range 24 East, Salt Lake Meridian, within the jurisdiction of the Uintah and Ouray Reservation, Utah, are being advertised for lease, bids on which will be opened October 29, 1951, at 2:00 P.M., at the office of Forrest R. Stone, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from Mr. J. R. Schwabrow, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

INTERNATIONAL

Royalty-Oil Contract Signed

The Colombian Government has signed a contract with Argentina's oil agency, Yacimientos Petroliferos Fiscales, to sell its royalty oil from the Barco concession for the year ending November 1952.

Y.P.F. will pay a 30-cent per barrel premium under terms of the contract. First shipments, which will run about 90,000 bbl. per month, are to be picked up in November. The year's contract is expected to involve a little more than 1,000,000 bbl.

The Colombian Government receives as royalty 10 per cent of the crude oil produced in the Barco. During the first half of this year, production totaled 5,135,188 bbl.

Sale of 1,000,000 bbl. of oil at a 30-cent premium would net the Colombian Government $300,000 above current royalty payments. Virtually all of oil involved has a gravity of about 32° A.P.I., with less than 10 per cent, that of the Petrolea structure, having a gravity of 46°.

During 1950, Barco crude oil sold at an average f.o.b. price of $2.635 per barrel.

Brazil to Develop Shale Oil

Brazil is going ahead with plans to develop its rich shale-oil deposits in the State of Sao Paulo.

Reports from Rio de Janeiro say the government now is planning tentatively to set up a 10,000-bbl. refinery. Samples of the shale have been sent to the United States and Sweden for studies to determine the best method of processing the shale.

Extensive deposits of oil shale lie in Sao Paulo and exploratory work has been carried on in the area for some time by Companhia Nacional de Oleos Mineraes, under control of the Brazilian Government.

Samples of the Tremembe-Taubate deposits, found in the Paraiba River Valley, were analyzed more than a year ago by the U. S. Bureau of Mines, which said the promising deposits might provide a partial solution for Brazil's persistent fuel shortages.

The Bureau of Mines tests showed an oil recovery of 12.3 gal. per ton of massive shale, 18.6 gal. per ton of semipaper shale, 36.5 gal. per ton from paper shale, and 21.3 gal. from run-of-mine shale.

Oil shales and other oil-bearing rocks have been found in 10 Brazilian states, but development work has been largely centered in the Tremembe-Taubate area. Shale in this area was reported to make illuminating oil as early as 1881.

In September 1950 Standard Oil Co. of Brazil announced it did not consider development of the shale deposits economically feasible and said the company was not interested in participating in their development.

Equipment Is Duty Exempt

A decree granting exemption from import duties on all equipment and operating supplies for Empresa Colombiana de Petroleos has been issued by the Colombian Government. The Empresa is the government organization which recently took over the De Mares concession from Tropical Oil Co. following expiration of the concession agreement.

The decree is similar to that which grants exemption to the oil companies operating in the Barco concession. It exempts from import duties all equipment and materials used in exploration, production, refining, and transportation.

Whether the exemptions later might be extended to all companies operating in Colombia was an unanswered question. At present operators in the Yondo area, which has a crude-oil production of about 38,000 bbl. per day, are required to pay the duties.

Israel Plans Detergent Plant

The Government of Israel is planning construction of a $2,500,000 polymerization and alkylation plant for the production of detergents.

The plant will operate on propylene supplied by the Haifa refinery of Consolidated Refineries, Ltd.

A government announcement said the plant would be designed for an annual detergent output of 3,000 to 3,500 tons, of which about 2,000 tons would be used to meet domestic needs and the rest exported. The 2,000 tons used domestically would be sufficient, it said, to reduce Israel's soap consumption by 50 per cent and improve the country's foreign-exchange balance by about $1,000,000 a year.

Central Area

(Continued from page 183)

water cut, about 200 bbl. of brine a day, may force at least temporary abandonment of production tests. Rods were being run for a pump test this week.

McClure's Sheridan Township wildcat, which is structurally higher than correlating control points, follows a core-drill program and other deeper-horizon tests in the same general area. The core dilling was done by Carter Oil Co., which is supporting the test, and Sun Oil Co., which also has acreage in the play.

This area is slated to draw more Traverse-objective exploratory work regardless of the outcome of this test. The possible new Traverse development is 1½ miles west of Sun Oil Co.'s Bishop Traverse pool, Newaygo County, another field which shows considerable water with its oil production.

Traverse lime at McClure 1 Johnson was logged 2,202 ft. Oil-water pay was drilled from 2,203¼-05 ft., present total depth. An estimated 250,000 cu. ft. of gas showed from the Traverse immediately after porosity was tapped. Hole carried 1,500 ft. of fluid in 7 hours natural of which only 450 ft. was oil.

ILLINOIS SUCCESSFUL WILDCATS

Jefferson County: Ervin & Bassett Drilling Co. 2 Hartley, SW SW SW 19-1s-1e, IP 25 bbl., Pennsylvanian 1,030-84 ft., TD 1,084 ft.

Peak Drilling Co. and Ralph Halbert 1 Brown, SE SE NW 8-3s-4e, IP 220 bbl., McClosky 3,053-56 ft., TD 3,063 ft.

ILLINOIS WILDCAT FAILURES

Clay County: Murvin-Steber Drilling Co. 1 Jennings, NW NE SE 13-4n-6e, dry, TD 2,991 ft.

Clinton County: Paul Schoendienst 1 Lacy, E½ NW NW 12-1n-3w, dry, TD 2,604 ft.

Fayette County: T. S. Doran 1 Smith heirs, SE SW NW 36-5n-4e, dry, TD 2,704 ft.

Franklin County: Kingwood Oil Co. 1 U. S. Coal & Coke, SE NW SE 20-6s-4e, dry, TD 3,199 ft.

Hamilton County: E. A. Obering 1 Wellen, NE SE SW 6-4s-6e, dry, TD 3,461 ft.

Jasper County: Skiles Oil Corp. 1 Frichil, NE NE SW 30-7n-10e, dry, TD 2,945 ft.

Marion County: H. F. Robison and R. L. Robbins 1 Kelchner, SW NW NW 21-3n-4e, dry, TD 2,540 ft.

W. B. White 1 Geiger, SE SW SE 30-4n-1e, dry, TD 1,455 ft.

Richland County: Perry Fulk 1 Dresser, NW NE NW 1-3n-9e, dry, TD 3,030 ft.

Saline County: Skiles Oil Corp. 1 Gaines, SW SE SW 20-7s-7e, dry, TD 3,244 ft.

Wabash County: Floyd Haskill 1 Corrie, NE NW NE 31-2n-12w, dry, TD 1,977 ft.

Washington County: Columbus Exploration Co. 1 Poirot, NW NW NE 15-2s-2w, dry, TD 3,200 ft.

White County: E. F. Moran and J. Buchman 1 Clifford, SE NE NW 29-5s-9e, dry, TD 3,420 ft.

INDIANA WILDCAT FAILURES

Fountain County: Ratcliff & Beckelhymer 1 Shelby, SE SE SW 13-20n-9w, dry, TD 897 ft.

Gibson County: Barron Kidd 1 Kerzan, NE SW SE 33-1s-10w, dry, TD 2,105 ft.

Knox County: Cline & Lambert 1 Wyatt, NE SW SE 32-2n-8w, dry, TD 1,598 ft.

Joe Bander 1 Meyer, Military Donation 174-2n-9w, dry, TD 1,618 ft.

Higgins & Appleby 1 Myers, Survey 22-2n-9w, dry, TD 1,700 ft.

N. W. Strange 1 Wittersede, Lot 148-2n-10w, dry, TD 1,955 ft.

Posey County: J. A. Boland 1 Murphy-Martin, NE NW SE 1-4s-13w, junked hole, TD 2,107 ft.

Calvert Drilling, Inc., 1 Wassen, SW NE SE 13-5s-13w, dry, TD 2,954 ft.

National Associated Petroleum Co. 1 Aldridge, NE SW NE 9-7s-12w, dry, TD 2,900 ft.

Slagter Producing Co. 1 Grabert, NE SW NE, 2-7s-13w, dry, TD 2,844 ft.

Spencer County: W. K. Snyder 1 Montgomery heirs, NE NW SW 35-7s-7w, dry, TD 1,782 ft.

Sullivan County: F. B. Cline 1 Hayden, SE NE NE 7-8n-10w, dry, TD 1,744 ft.

Vanderburgh County: Slagter Producing Co. 1 Schauss, SE NW NE 1-5s-11w, dry, TD 2,531 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

McLean County: Miller-Shirella-Ashland Oil & Refining Co. 1 Baugh heirs, SW SE NE NW 14-N-27, IP 60 bbl., Cypress 1,890-98 ft., TD 1,927 ft. (extension Wyman pool).

MICHIGAN WILDCAT FAILURES

Allegan County: Dorr Township: Ford Henry 1 Miller, NE NE NE 17-4n-12w, traverse 1,628 ft., dry, TD 1,642 ft.

Gladwin County, Grout Township: Pure Oil Co. 1 Schultze, SW NW NW 12-18n-2w, dry in Marshall, TD 1,268 ft.

Secord Township: Basin Oil Co., Ogma Development Co. and Wm. B. Stewart, A-2 State-Secord, NW SE NW 16-19n-1e, Dundee 3,408 ft., dry, TD 3,491 ft.

Oceana County, Golden Township: Robert W. Devine and J. W. Lang Co. 1 Fuller, NW SE SE 10-15n-18w, Dundee 2,235 ft., dry, TD 2,348 ft.

Wexford County, Haring Township: Cy C. Jetter 1 Webb, SW NE SW 13-22n-9w, Traverse 3,109 ft., dry, TD 3,270 ft.

EQUIPMENT MEN

(Continued from page 191)

Allis-Chalmers Transfers Godfrey to New York Office

Howard R. Godfrey, Jr., for the last 18 months an assistant engineer in Allis-Chalmers Manufacturing Co. centrifugal pump department, has been assigned to the chemical and petroleum section of the company's New York district office.

Godfrey is a mechanical engineering graduate of Oregon State College and has been with Allis-Chalmers since 1948.

Griffin to Manage New Trailmobile Branch

Establishment in Birmingham, Ala., of a new factory branch of Trailmobile, Inc., manufacturers of commercial truck-trailers, and the appointment of W. C. Griffin of Birmingham as branch manager has been announced by W. A. Burns, Jr., vice president and sales manager of Trailmobile, Inc.

Since March 1950, Trailmobile has been operating its Birmingham sales activity as a subbranch under Atlanta, and has now raised its Birmingham operation to full branch status.

Griffin became associated with Trailmobile in 1949 and was employed as a resident salesman in the Atlanta branch until the establishment of the subbranch in Birmingham, where he has been located since.

White Is Named Somastic Manager by H. C. Price

R. P. White, veteran Gulf Coast Somastic manager for H. C. Price Co., has been named manager of its coating operations in the 37 states east of the Rocky Mountains, according to an announcement by J. S. Dewar, Somastic Division, vice president.

The following changes in Price Co.'s Somastic Division were also announced by Dewar: H. N. VerSoy named manager, and Leo C. Carle named assistant manager, Gulf Coast division; Montie J. Lane named manager, and Troy L. Huit named assistant manager; and C. V. Johnson placed in charge of sales, East Coast division.

White began his career in Somastic in 1940. He has been in charge of Gulf Coast operations since a permanent Somastic plant was located at Harvey, La., in 1949. In his new position White will operate out of Price's headquarters in Bartlesville.

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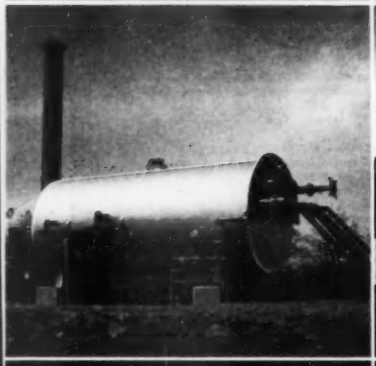

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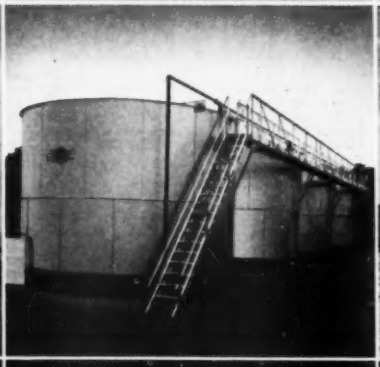

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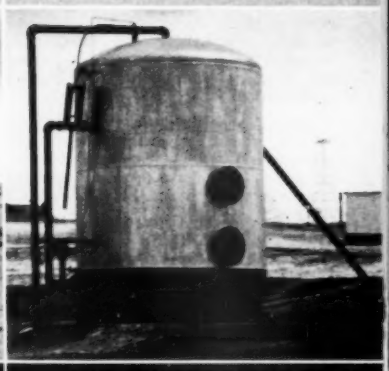

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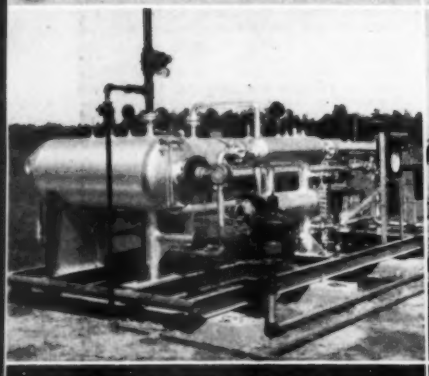

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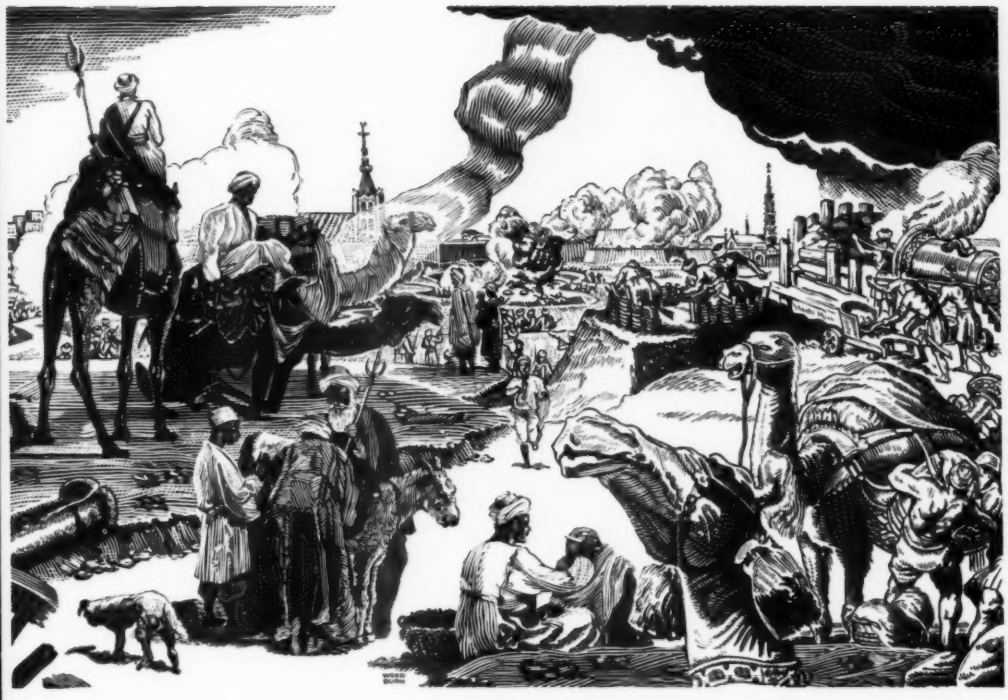

Steel saved civilization at Vienna

MODERN history begins with the record of conflict between Christians and Moslems--six centuries of wars that opened with the Crusades and saw the Turks capture Constantinople in 1453.

More than 100,000 Turkish janizaries and cavalry besieged Vienna in 1683. For two months, to quote the diary of an eye witness, "The enemy continued playing their cannon and granadoes. But the city walls were strong, Christian cannon were bigger and more numerous and ammunition more plentiful." Finally came a day when the officer's journal reported, "The enemy did not play their cannon so fast. It was confirmed that they had no great provision of bullets, inasmuch as they shot back not only our bullets, but also pummels of swords and all sorts of iron and stones."

At last a great Christian relief army was assembled. "They made an attack in the best order that ever army did. The enemy, forced always to give back, were put all into confusion. They betook themselves to flight, leaving all their provisions, ammunition, cannons and tents --the greatest part rendered unfit for farther use by our great guns."

Never again did the Turks seriously menace Christendom. Western civilization had been saved once more by its supremacy in the use of iron and steel. To aid our survival America's free private industry is producing steel at the highest rate ever known--and still expanding. The question remains--Will America use enough of this tremendous steel production to guarantee the continued supremacy of Western, Christian civilization?---We believe the answer is yes!

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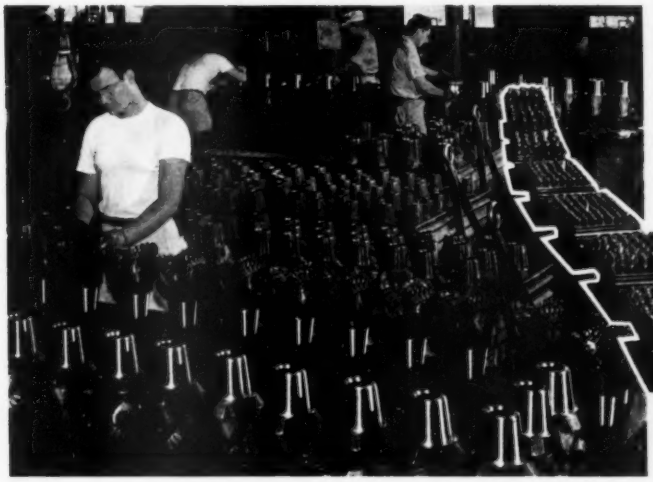

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